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OCTOBER 1953

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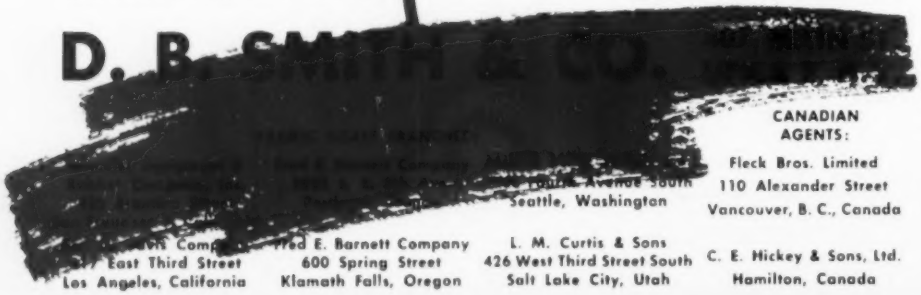

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Photo taken by H. A. Fowells

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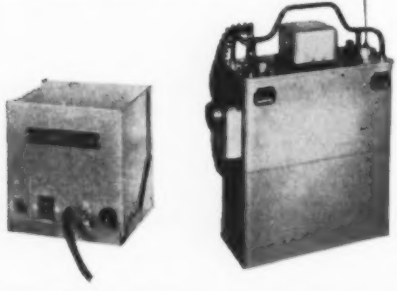

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Official Organ of the Society of American Foresters

A Discussion of Financial Maturity

Financial Maturity: A Questionable Concept in Forest Management

Albert C. Worrell
Associate professor of Forest Economics, University of Georgia, Athens.

Every forester managing a forest property is faced with the problem of what to remove in his annual or periodic harvests. When should a stand or individual tree be considered ripe for the saw? With today's markets, trees attain merchantability at an early age. But they continue to grow and increase in value for many years thereafter. What should be the forester's guide in making intelligent plans for harvesting his crop?

RECENT PUBLICATIONS of the Southern Forest Experiment Station (*3, 4*) have proposed that "financial maturity" be used as the basis on which to decide when to harvest trees. In these publications "financial maturity" has been applied to forests under many-aged systems of management, though the statement is made that the "idea can be used, if properly adapted, under any silvicultural system" (*3*). The determination of "financial maturity" consists of three steps. First, the owner determines the rate of return he can expect from his money in the best alternative investment open to him. He has the option of harvesting the tree in question and investing the net cash return from it at this alternative rate. Second, he determines the prospective rate of increase in value of the tree during some future period. Third, he compares the two rates. (These are compound interest rates.) If the increase in tree value represents a rate of return on its present value greater than it could earn in any alternative investment of equal risk, the tree is not yet "financially mature." It should be kept on the stump until it reaches an age when its prospective rate of future value increase falls below the alternative rate. If the owner's alternative rate is 3 percent he should not cut his tree until its rate of value increase falls below 3 percent.

This appears to be a simple application of marginal analysis to a tree. The value of the tree increases through successive periods of time. The marginal revenue from holding the tree for an additional unit of time is the increase in its cash value. The marginal cost is the sum which the tree's cash value could earn in an alternative investment during that time. So long as the marginal revenue exceeds the marginal cost, the total value of the tree is increased by holding it for an additional unit of time. If the marginal revenue is below the marginal cost, holding the tree longer will decrease the total value. The maximum total value can thus be obtained by holding the tree to the age at which its rate of value increase in the next year exactly equals the alternative rate of return on capital.

But, does the possible alternative earning of the cash value of this tree represent the real marginal cost of holding it for the additional period of time? What about such costs as taxes and fire protection? The answer may be that these are fixed costs, and as such are not affected by what is done with this tree; they must be paid whether it is cut or left. But these fixed costs must then be incurred because of the existence of some other productive factor than the tree itself. That factor, of course, is land. The increase in value of the tree results from the combination of capital in the form of the tree with the land on which it stands. In order to produce the marginal revenue, not only a certain amount of capital is tied up, but a certain amount of land also. Unless the use of this land during that time is free, the marginal cost used in the "financial maturity" calculation is not the complete cost.

Using the land for the future period entails an opportunity cost similar to that of keeping the capital tied up in the tree. If the tree were cut, the land could be put to other use. The cost of using the land to support the tree for another period is the net return it could produce in its best alternative use. This is readily seen in a situation where cutting the tree would clear the land for use in producing agricultural crops. But it is true of strictly forest land too—if the tree is cut a new crop of timber can grow on the land. The value of the young timber which might be grown on this land during the period is the cost of continuing to use the land to support the merchantable tree.

The concept of "financial maturity" is not valid, then, unless the marginal cost used in the comparison includes the alternative costs of both land and capital. Even if this is done, the result of holding the tree to the age where the marginal rate of revenue increase just equals the marginal rate of cost increase is to maximize the return *per tree*. In fact, Gut-

tenberg and Putnam say "this offers a method . . . for deciding when to cut a tree in order to make the most money from growing and harvesting it" (*3*). But the timber grower is interested in maximizing his total annual profit. "The firm will maximize total profit if it maximizes that rate of profit which expresses profit per unit of some quantity or factor that is fixed to the firm, because this rate of profit will be maximized simultaneously with total profit. . . . Hence, to maximize his total profit, the producer must maximize profit per unit of whichever of his factors is fixed or limited in quantity" (*5*). If the timber grower were limited to harvesting and selling a certain number of trees each year, he would realize the greatest profit by obtaining the largest possible return per tree. But this is not the case.

The fixed factor for most timber growers is land. Their problem is to make the largest total annual profit with a given amount of land. To do this management must aim at the maximum return per acre. In some cases the amount of capital at the grower's command may not be sufficient to maximize profit per acre on all his land. The fixed factor then is the capital fund and management must aim at the maximum rate of return on the capital investment.

Timber production requires land, capital, and time. The amount of timber produced annually per acre varies with the amount of capital (in the form of planting, improvement work, etc.) combined with the land, and the length of time the combination is continued. The net value of the timber produced will be different at the end of various periods of time (rotations). Now, the effect of leaving the tree for an additional period of time is to lengthen the rotation. But if the property is under sustained management, rotation will follow rotation and each acre will produce net yields at intervals on into the indefinite future. Holding the presently merchantable tree on the ground for an additional period, therefore, postpones all future incomes from that land.

Different rotations mean yields at different future intervals. These cannot all be equally profitable, and the question in our case is whether it will be more profitable to operate on the longer rotation which would result from holding the tree to "financial maturity." Incomes occurring at different points in time can be compared only by adjusting them to a common point. The simplest concept is to discount all future incomes back to the present and to compare their present values. "The most important consideration in appraising the comparative present worth of crops given uniform treatment but grown on rotations of different lengths is the fact that the shorter the rotation, the more often will final crops of timber be harvested on the same acre. It would be impossible to compare *single* rotations of different lengths without considering this repetition, which accounts, *now*, for *all* future net income" (*2*). This apparently has been overlooked in the "financial maturity" concept.

Let us first face the problem of combining a fixed amount of capital with a fixed amount of land to produce timber. The owner's capital fund may be sufficient only to pay taxes and protection costs on his land and to plant each acre after it is harvested. What rotation will be most profitable for him? Two factors influencing this decision are beyond his control: the productive capacity of his land, and the prices he can obtain for the products he might grow. He must try to maximize his profit under these given conditions. In this case, the fixed factor of production is the capital fund, so if the owner maximizes the rate of return on his investment he will also maximize his total profit.

At this point, the alternative rate of return which might be obtained by investing the capital elsewhere must be considered. If no conceivable rotation will yield a rate of return on the forest investment as large as the alternative rate, he will not invest in forestry at all. If the forest return can exceed the alternative rate, he will invest in the forest, but his choice of a rotation will be made without regard to the alternative rate. His aim will be to maximize what Boulding calls the "internal rate of return" on his investment.[1] The total revenue obtainable at harvest time increases with the length of the rotation, first at an increasing rate and later at a decreasing rate. The average rate of total revenue growth, therefore, increases during the early life of the forest and decreases again in later life. If the timber is harvested at the age when the average rate of growth is a maximum, a new stand is started, and the process is repeated, the average rate of growth for the whole future of the stand will be a maximum. This will be the most profitable rotation on which to operate because the internal rate of return is a maximum. It does not make any difference what the alternative rate is, so long as the maximum internal rate exceeds it.

If only one rotation (not repeated) is considered, the most profitable one is that with the maximum discounted net revenue. This maximum is obtained with the rotation for which the rate of revenue increase exactly equals the rate of cost increase at the end of the rotation (*1*). In other words, it pays to hold timber up to the year when the rate of increase in sale value is the same as the alternative rate which could be earned elsewhere. This, of course, is what the financial maturity concept proposes. It errs in not considering subsequent production periods. If the timber were being liquidated, and the land would have no productive value after the timber was removed, it would pay to hold the tree to "financial maturity." But it is not valid for forests under sustained management.

The discounted net revenue for one rotation is given by the familiar formula: $V_n = V_n / (1 + p)^n$. If the rotation is repeated on into

[1] The best discussion of this question of the period of investment and time production equilibria is to be found in chapter 36 of *Economic Analysis*, by K. E. Boulding. Harper & Bros., New York, 1948.

the future the present worth of the permanent series of periodic net revenues is given by the formula: $V_a = a / (1 + p)^n - 1$. If the same rotation length is used a is equal to V_a but the present value of the periodic incomes is, of course, larger than that of only one income. If various rotations are compared for the same land and capital investment using these two formulas, it is found that the present worth of the permanent series is maximized at a shorter rotation length than is the discounted net revenue for a single rotation. This is because the present worth of a permanent series of incomes is a maximum when the internal rate of return in that series is a maximum. The way to determine what rotation to use with a given tract of land and capital fund therefore, is to calculate the present worths of the different series of permanent periodic incomes resulting from different rotation lengths. The rotation showing the maximum present worth will be the most profitable. The rate of interest used in the calculation has no effect on the comparison as Chapman and Meyer have noted (*2*, p. 176). This is true because the aim of the choice is to maximize the internal rate of return regardless of the going or alternative rate.

Let us now consider the case where the amount of land is fixed but the capital fund is not limited. It is, therefore, possible to invest any amount of capital on the land. The problem of what rotation to use arises again, but we have also the problem of how much capital to invest. Since land is now the fixed factor, the solution will lie in maximizing the return per acre. The return to land consists of economic rent — the net revenue remaining after all other costs of production are paid, including capital at its alternative rate. Because this economic rent is realized only at the time of harvesting the timber, and will be realized periodically in the future, it is necessary for comparative purposes to reduce it to a value at one point in time. "Present worth of forestry under various systems of management is appraised by estimating prospective net incomes and discounting their sum to the present time. . . . For this reason the basic theory underlying comparative forest valuation may appropriately be called 'maximum discounted economic rent'" (*6*).

Now, for any fixed capital fund, the maximum discounted economic rent is obtained at the rotation which produces the maximum internal rate of return on the investment. This is the most efficient use of that amount of capital per acre. When additional capital is added, it will change either the amount of total revenue, or the time pattern of growth in total revenue, or both. It is necessary, therefore, to determine the most efficient rotation for this new total capital fund. The most profitable rotation is almost certain to change as the amount of capital used is changed. A schedule can thus be drawn up showing the most profitable rotations for different amounts of capital applied to a fixed amount of land. We are left with the problem of what amount of capital to use. When we determine the most profitable amount of capital, we will simultaneously determine the most profitable rotation, because we must use the most efficient rotation for that amount of capital as shown in the schedule.

The most profitable amount of capital to use will be that which produces the maximum discounted economic rent. The choice can be made, therefore, by comparing the discounted economic rents obtained with the most efficient rotations for the various amounts of capital. However, in the calculation of these discounted economic rents the interest rate used must be the alternative rate available to capital. This is necessary because economic rent is a residual after all other factors have been paid at their alternative rates. The alternative rate available to capital has no influence on the choice of the most profitable rotation for a fixed amount of capital, but it does affect the choice of the most profitable amount of capital to use with a given amount of land.

Starting with the use of a small amount of capital we will find that the discounted economic rent will increase as the amount of capital used is increased. Eventually, however, we reach a maximum discounted economic rent, and any increase in the amount of capital used beyond this will result in a decrease in economic rent. This is the most efficient combination with which to produce timber under the existing conditions. Capital is earning the greatest internal rate of return which it can with the amount of land available, and land is earning the greatest economic rent which it can with any amount of capital. The profit to the timber grower is maximized by using this amount of capital and this rotation.

Summary

The age at which trees should be harvested in a forest under management is that which will produce the maximum annual revenue on a sustained basis. Forestry consists of a continuously repeated series of operations and its profitability is measured by the *average* net revenue obtained. The mere fact that the marginal revenue from holding mature trees for an extra period of time exceeds the marginal cost does not indicate its desirability. If the marginal net revenue for this period is less than the average net revenue for the preceding life of the tree, the effect of holding the tree for this extra period would be to reduce the average net revenue. The marginal analysis can be applied legitimately to the problem of adding capital to a forestry enterprise only if its effect on the time-production equilibrium is recognized. It can be applied to the choice of the most profitable amount of capital to use in connection with the schedule of maximum discounted economic rents described above. The margins to be compared here are the marginal discounted revenue and the marginal discounted cost. When the marginal discounted revenue from using an additional unit of capital is just equal to its marginal discounted cost, the

discounted economic rent will be a maximum.

Most of this discussion has been built around even-aged management. The same reasoning applies to all-aged management, though it may not be so easy to see. The same opportunity exists in a selection forest to harvest the mature tree and start growing another crop of trees on the land it occupies. The same goal should exist—to produce the maximum net revenue with the land and capital used. And the age to which the tree is grown should be that which will maximize the rate of revenue growth.

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Financial Maturity Versus Soil-Rent

Sam Guttenberg
Southern Forest Experiment Station.[1]

WORRELL explains in some detail one theoretically sound method of appraising stand maturity for even-aged conditions. He has failed to realize that the financial maturity approach (marginal analysis) is simply another sound method that can be applied to even-aged conditions. More to the point, given the same data and conditions, the financial maturity approach, and that suggested as the correct one by Worrell, would yield precisely the same answers. Also, Worrell offers no practical way of coming to grips with the everyday problem of selecting trees for harvest, whereas the financial maturity papers cited are primarily concerned with this problem under the following conditions:

1. A forest property committed to a sustained flow of timber for a sawmilling enterprise.
2. The allowable cut held to somewhat less than prospective growth, in order to improve stocking of the stand.
3. Trees to be managed on a many-aged (individual tree or group-selection) system of silviculture.

The cloud of doubt spread over the financial maturity concept arises from Worrell's overlooking critical portions of the text. For example, on page 21 of "Financial Maturity of Bottomland Red Oak and Sweetgum" appears:

> In judging financial maturity, one cannot, of course, consider a tree solely on its own merits. Every forest tree is in more or less competition with other trees, and this competition affects the desirability of the tree as an investment. Some trees which, judged alone, are apparently financially mature turn out not to be mature when one or more other trees are brought into consideration. Likewise, trees may prove to be mature which, considered by themselves, were not so. The principle covering the effect of other trees upon financial maturity is this: the aim of the manager should be to maintain on each acre that volume of timber, which, within the requirements of the silvicultural system and the program of regulation, has the greatest possible conversion surplus in trees not yet financially mature. For reasons made clear in the reference cited in footnote 2 (Duerr, William A., and Bond, W. E., 1952. Optimum stocking of a selection forest. Jour. forestry 50:12-16), this principle will result in securing the highest income from each acre that the alternative rate of return will afford.

This quotation disposes of most of the issues raised. It should be clear that Worrell's emphasis on the individual tree independent of stand considerations is his own creation and not that of the authors cited. The quotation points out that alternative trees both present and prospective (future crops) must be considered. Moreover, the "financial maturity" concept maximizes income *per acre*—not per tree. Other critical statements in the literature cited in regard to the alternative rate of return, silvicultural considerations, and the like have also been overlooked.

In brief, it seems to me that:

1. Worrell is questioning his own concept of financial maturity, and not that presented in the publications he criticizes.

2. The financial maturity approach enables the user to work out rules for timber markers, while the academic concept of soil-rent analysis offers no such practical application.

[1] Forest Service, U. S. Dept. Agric., New Orleans, La.

Television and Forestry[1]

Floyd E. Carlson
Associate professor of Forest Extension, State University of New York College of Forestry, Syracuse.

TELEVISION IS A master tool. It is a master tool for the forester and conservationist. It has everything but color—and color is coming.

Television is a tool that is needed. It is needed in the next steps in meeting the demands for more water, more lumber, more paper, more wildlife, more recreational facilities, and more production of human satisfaction from each acre of farm and forest.

Television is a timely tool. The world is probably more in a state of flux now than in its entire history. The mind of mankind is subject to more questions, is open to more ideas, is seeking more guidance mentally and spiritually than ever before. This mental state of flux, this quest of the spirit, is nationwide; it is global. The emphasis on audio-visual education in this country, the use of radio and motion pictures in particular, are a background in preparation for the greatest tool of education of the ages—the electronic genie that can focus sound and sight on a single screen.

To say that this genie is immature, that its antics are adolescent, that its manners are sometimes atrocious and that now and then it can hardly be looked on with respect, is not to deny that television is well on the way to becoming a giant, that its attention-getting capability is without parallel and that with maturity, this prodigy of the electronic family will take on both responsibility and judgment.

Meanwhile as foresters and conservationists we can ill afford to close our eyes to television because of occasional questionable deportment. Rather let us insure that, by our very interest, and active participation, we may claim a share of responsibility for the improved showing which this prodigious youngster may make as a consequence of our having applied our hand in training and directing its behavior.

[1]Presented at S.A.F.C.I.F. meeting, Montreal, Canada, Nov., 1952.

First Forestry Broadcast

On May 22, 1946, the State University College of Forestry at Syracuse, New York, broadcast its first television program from the General Electric Station WRGB, Schenectady, New York; a program titled "Poison Ivy—Don't Get Rash!" There were at that time just six commercial television stations in operation in the United States. In 1947 there were ten, broadcasting at least four hours a week. (*1*)

The importance of television as a medium for selling ideas and products was forcefully stated recently by Paul A. Walker, Chairman of the Federal Communications Commission, when he said, "Last year (1951) with only 14 million television sets in existence, the networks derived a greater proportion of their revenues from the newly-established television than they did from their 30-year-old AM radio." (*10*) As of November, 1952, there were 112 television stations in operation in the United States, most of them tied in to four networks: N.B.C., A.B.C., Columbia, and Dumont; the largest of which was N.B.C. with 44 television affiliates as of November 7, 1952.

The television industry is now predicting that by 1954 there will be 40 million sets in the United States, and R.C.A. Chairman David Sarnoff predicts that by 1957 there will be 1,500 television stations on the air. (*9*)

Past, Present, and Anticipated Use of Television in Forestry

Now with these facts and estimates before us, let's see how foresters have been doing on television and what their expectations are for using it in the future.

As far as is known, the United States Forest Service was the first forestry agency to use television in this country. The honor goes to Bill Bergoffen, who was responsible for originating a telecast over Philco's TV Station WPTZ, Philadelphia, on July 2, 1945, in an hour-long show using slides and three Forest Service films, called "National Forest Highlights." American Forest Products Industries has furnished films to TV stations of the country "for 3 or 4 years." The New York State Conservation Department used TV in 1948 on one of the first commercial television stations in the United States, located at Schenectady. Here Station WRGB began broadcasting shortly before the war and has been on the air since 1939. As far as is known, the College of Forestry telecast on May 22, 1946, over WRGB, was the first in the United States to be produced by a forestry school. The College of Forestry at Syracuse is also believed to have produced the first series of television programs on forestry and conservation in the nation. This was a weekly series called "Tree Time" and produced by the writer, once a week, for 25 weeks over Station WHEN in Syracuse, New York, beginning December 16, 1948.

On October 20 of this year we conducted a nationwide survey at the college to find out the current use of TV by forest schools, state departments of forestry, the Forest Service, conservation agencies, and forest organizations concerned principally with forest products. From 146 questionnaires sent out, we received 119 replies. Out of 45 schools replying, 8 forest schools are now using TV and 10 will be using it. Thirty-one indicated a favorable interest. Regarding state departments of forestry, from 35 replies 17 departments are now using TV, 7 expect to use it in the future, and 11 anticipate no use of TV for some time.

Of the 10 replies from the For-

est Service Divisions of Information and Education, 8 are now putting on TV programs and 1 expects to use TV as it becomes available, and 1 had no comment.

Of the 28 conservation agencies and forest agencies replying, 4 said they were using TV and 4 said they will be using it more in the future. Twenty do not expect to use it for some time.

In summary, the questionnaire showed 91 indicating favorable interest in TV and 6 opposed to TV or doubtful of its value as a mass medium for the forester or conservationist to use.

Present TV Programs on Forestry

Television programs on stations today fall generally into four classes. The program may come from a network so a local station simply carries it. The program can be put on by using film. A third type of program for more or less unusual situations is by remote location, such as relaying a baseball or football game by coaxial cable or portable equipment; and the fourth type may originate entirely or in part as a "live" studio production.

Where foresters are using TV, what kind of programs are they using? The replies showed live or studio programs, 20; use of film entirely, 20; and 6 are using both.

What about the length of TV programs? Nine of them are 5 minutes, sixteen of them are 15 minutes, and five are a half hour, fourteen varied in length from 5 to 25 minutes.

As to frequency of telecasts, among those who anticipate using this medium, 62 percent said they expected to use TV occasionally; 17 percent monthly; and 21 percent weekly.

Television Opportunity for Conservationists and Foresters

A brochure published in 1952 by the National Council of the Churches of Christ in America Broadcasting and Film Commission, carries this arresting statement: "There are 70,000 more people on the earth today than there were yesterday. This year there will be 25 million more people in the world than last year." (*1*) The increased demand these increasing populations make on our natural resources on a global scale is apparent. With subsistence standards of living in many lands, there will continue to be shipments of food and fiber abroad, plus increased use of food and fiber on the North American continent resulting from our own population increase. These conditions suggest that today's management of North American natural resources is not going to be good enough tomorrow.

The increased requirements of food, fiber, water, and the recreational needs in the United States make the need for efficient, more scientific handling of our natural resources and more public appreciation of our absolute dependence upon them vital.

Ask any group of thinking people how these objectives are going to be more fully obtained and they will reply, "By education."

Where does TV fit into this picture of need? At the time the Federal Communications Commission thawed out the freeze on TV construction permits, they reserved 242 channels for the use of educators. Eighty of these are in the very high frequency and 162 in the ultra-high frequency spectrum.

The use of these channels for education will be determined in the majority of instances by the willingness of state legislatures to support it. Where this support is forthcoming the opportunity to foresters, conservationists and their agencies to participate on TV channels used exclusively for non-commercial programs is without parallel in conservation history. The concern for the improvement of forest, soil, water, recreation and wildlife is being pushed by hundreds of organizations. The conservation idea is becoming more deeply planted among teachers and youth especially. The door to educational TV programs, already ajar on many commercial stations, will in my opinion swing wide open to conservationists where educational stations are established.

Here the big opportunity will be to broadcast directly into classrooms and to meet adult audiences at a favorable time. As a basis for our thinking in regard to the schools, let me remind you that in the United States, for the next six years, there will be each year 1,200,000 more pupils in the elementary grades. (*6*) As to adults interested in educational opportunities, a survey has shown that 4 million Americans are in classes now. Another million are taking correspondence courses, 7 million attend demonstrations and classes conducted by county agents and 40 percent of adults interviewed are interested in further education of a systematic kind. (*11*) On the educational channels therefore the forester may find a new tool to aid him. He may hasten the advancement of forest management among owners of small forest properties by using TV to reach the 4-H Club boys and girls and Future Farmer students in their classrooms.

The Joint Committee on Educational Television is made up of the American Council on Education, the Association for Education by Radio and Television, the Association of Land Grant Colleges and Universities, the National Association of Educational Broadcasters, the National Association of State Universities, National Council of Chief State School Officers, and the National Education Association of the United States. Their cooperative effort has so impressed the Ford Foundation that the Ford Fund for Adult Education has granted $5,000,000 to help in both educational station construction and program development.

1,500 New TV Stations

Another amazing development that can affect the opportunities for conservation education is the estimated building of 1,500 new TV stations in the next five years. The current number of daily newspapers in the United States according to Editor and Publisher's 1952 International Yearbook, was "1,773 as of January 1, 1952." (*2*) In the next 10 years the num-

ber of operating television stations may equal or exceed that of the number of daily newspapers in the United States.

Whether it be an educational or commercial station, the new TV station will be looking for programs. Because an older station may have used several networks, the addition of new stations as a network affiliate will open more program opportunities. A new TV station is required to fill a certain amount of time each day to hold its license, therefore the need for programs will be tremendous. Many stations will not be on the network for some time. The time to get forestry programs going in any one community is while the station is young. At Syracuse, station WHEN started telecasts on December 1, 1948. On December 16 of the same month, the College of Forestry went on the air with a 25-week series called "Tree Time." The "Tree Time" series featuring forestry and conservation subjects was so acceptable that the following year we extended this to a 35-week series. This experience has proved most reassuringly that the public wants programs on the real things of life.

The progressive forest agency has a story to tell. In telling that story, it must compete for attention with other public and private agencies. You can be certain they will use TV. To compete, we cannot ignore the use of TV. In the public relations field there is no approach to be compared with it for public relations value and results. No printed page, radio program, illustrated magazine story, can bring as direct an approach to a mass audience as TV. To a forestry agency or institution with an idea or a product to sell, TV offers the strongest medium for selling that idea or product.

To our urban-concentrated population, TV programs on conservation topics have a special appeal—the appeal of the out-of-doors. This appeal is also reflected in the interest of radio and television station executives. In radio it has been the writer's experience that a large number of station managers and particularly program directors of both individual stations and networks are interested in programs relating to the out-of-doors and in the general problems of conservation. The experience of the Forest Service in the Bill Scott Ranger radio series is further evidence. Many conservation agencies all over the country have had excellent cooperation from radio station management on programs about forestry, soil conservation, farm woodlot management, and wildlife. The point I am making is that, as we have in radio, we shall likewise find in television a warm reception in the majority of instances, particularly to ideas for a series of television programs. The experience of American Forest Products Industries in servicing stations with films further demonstrates this interest.

Some Likely Consequences of Extensive Use of Television

In my opinion, one result of the use of TV, say on a once a week basis, will be to stimulate cooperative activity among conservation agencies. Any agency or institution which may take the leadership in starting a television series on forestry or conservation will soon discover that in order to hold public interest in a weekly program over a period of time, it must present new subjects and new faces. To achieve this diversity requires the enthusiastic cooperation of a wide range of participants.

During the College of Forestry's 25-week television series, there appeared both forestry deans of the college, 18 faculty members, 37 students, 9 businessmen, 4 members of the Forest Service, 2 Boy Scouts, directors of the County Park Board, representatives of forest industries, Soil Conservation Service and Farm Bureau, 6 graduate students, 3 faculty wives, 2 stenographers, and 2 children.

The possibilities of cooperative effort as a key to successful television programming are shown clearly and significantly in what churches are doing in television. Under the National Council of the Churches of Christ in the United States of America, there is a Broadcasting and Film Commission with headquarters at 220 Fifth Avenue, New York City. Their report for 1951 showed that by cooperative action the churches had been successful in producing 161 network television programs as well as special events programs on television numbering over 100. (5) The placing, promoting, and production of these TV programs would have been impossible without a united church approach to the television stations, television networks and facilities. TV has acted in this instance as a catalytic agent. It has created a need for a cooperative approach to television production. It seems to me that in a number of instances forestry and conservation agencies have a similar opportunity for getting together in presenting effective programs in television on both commercial and educational stations, and as a consequence of acting together, there is a much better chance to get a more favorable time for their telecast.

Television's Effect on Motion Picture Production

The use of film in TV production is constantly increasing. More film is now being produced for TV and for TV kinescope recordings than is produced by the entire motion picture industry. If you are prepared to tell your story of forestry or conservation on film, film offers one of the most satisfactory ways to get time on a TV station, especially a new station. If you can offer a film program or series, no rehearsal is required, no program planning conferences, or uncertainty in filling the time slot. As a result, any time film is used for a complete telecast, it is low-cost production for the local television station.

To agencies producing film for television use, what are some of the considerations?

The length of film that is most desirable for use on TV for the occasional presentation is, in my opinion the half-hour film, but the

quarter-hour film is ideal when made up for presenting over a series of 13 or 26 weeks.

In the future, film designed for educational telecasting will be considerably simplified and will be produced with emphasis on slower development of ideas, in contrast to striving for coverage. The simple type motion picture will be far less costly to produce.

A recent survey called "A Study of Education-Industry Cooperation" shows that while 69 percent of the teachers want more motion pictures, ". . . . Teachers also say (regarding industry-sponsored film) many films are not suited to school needs. . . . Educational values are frequently subordinated to entertainment and advertising. . . . Many films are too long for the class period. . . . In some cases, films attempt to cover too many topics. . . . Materials should contain information which is accurate, complete and sincere, using neither bias or propaganda methods. Truth and accuracy are of primary importance to students." These are the results of a survey in which educators all over the country participated and in which more than 800 teachers were interviewed regarding use of sponsored materials. (3)

In the summary of an analysis of more than 200 separate research studies of educational effects of motion pictures in the United States and elsewhere, we find, among others, these results:

1. The use of effective and appropriate films result in more learning in less time and better retention of what is learned.

2. Films facilitate thinking and problem handling.

3. The rate of development (of the individual motion picture) influences the impact of a motion picture on its audience. Rapid rate of development in the presentation of a subject in an instructional film reduces the amount of learning from the film.

In the conclusion of this exhaustive film research survey is this statement: "Of all the devices of mass communication, motion pictures and their counterpart, television, are unquestionably the most powerful." (7)

Steps in Preparing TV Programs

When television arrives in your community, get acquainted as soon as possible with the manager and station personnel. Let them know your interest in TV. The program director is a key man with a big job in program building. When you are ready to talk to him about television programs, he will give you much better attention if you can show him a carefully outlined list of several programs. Have a title limited to five words for the series. Explain clearly the reasons for your enthusiasm about the program and what audience it is intended to interest.

Give him an idea of just how you are planning to present the program; by demonstration, round table discussion, interview, dramatization or other format; that is how the program will start, who will introduce it, etc. (8)

It is desirable to give continuity to a program, where a series are presented, by having some one person introduce the program week by week. Another important consideration in planning a series is publicizing it in as many ways as possible. An adequate publicity program will help to pin the program in at a particular time on the TV schedule and not have it shifted from hour to hour or from one day to another.

Once time has been secured on the station schedule and the general theme of the series has been established, there are certain questions that must be answered in working on a telecast.

1. What general idea is to be emphasized? Is it timely? Is it seasonal?

2. On live (that is, studio) programs, who will present this central idea? Is he a livewire?

3. What are the two or three main points at most that should be highlighted?

4. What visual materials, slides, motion pictures, models, live specimens, etc., are available that may be used to demonstrate, clarify, or help to create interest in emphasizing these points?

5. Can a part of the program be dramatized to heighten interest?

When these questions have been answered the next steps are:

6. An outline script of the entire telecast based on the time available, and listing the visual materials used to amplify topics. It must be stressed to the participants that they will not be working with a script which they need to memorize, but rather they will be expected to follow an outline and carry the program entirely ad lib.

7. Rehearse the program with a stop watch to check the timing. Every individual must rehearse at least once.

8. Limit the number on any one set to three as a rule.

9. Have a carefully worked out and strong conclusion and time it so that it can be directly gone into on signal.

10. Present television program ideas to the individuals who are to participate on it at least a month in advance of the date for the telecast. Plan the first rehearsal or walk-through two weeks in advance of the telecast. Follow a week later with a second rehearsal. This is far more satisfactory than long rehearsals just a day or two ahead of the telecast.

11. Develop the plan for the telecast with the participants and in the presence of the television station's director assigned to the particular program. Leave the door wide open for suggestions. The vitality and enthusiasm exhibited during the telecast will be generated at this initial program planning session. The public's impression must be that the participants on the program are thoroughly prepared, know exactly what they are doing and are enthusiastically conveying their interest and sincere beliefs to their viewers.

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Dr. Bronk To Keynote American Forest Congress

Dr. Detlev W. Bronk, president of the Rockefeller Institute for Medical Research, the American Assn. for the Advancement of Science, and the Academy of Science, will make the keynote address at the Fourth American Forest Congress called by the American Forestry Assn. Oct. 29-31 in Washington, D. C.

Dr. Bronk's subject will be, "Forestry in the World Resource Picture."

Dean Hardy L. Shirley, State University of New York College of Forestry, chairman of the program committee, has announced plans for the meeting based on the agenda prepared at A.F.A.'s June conference at Higgins Lake, Mich. These plans include remarks at the opening session by President Eisenhower, and short talks by the Secretaries of Agriculture and the Interior, a representative of the Canadian government, and a representative of industry, as well as Dr. Bronk's address.

Topics of the various meetings will be: forest land management; multiple use of forest lands; forestry research and education; and forest landownership.

Planning for Sustained Yield Operations[1]

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THE TERMS "selective cutting" and "sustained yield management" are often used loosely and their real meanings lost in arguments over who is or is not doing a good job of managing forest lands. It seems important to define exactly what is meant by the term "sustained yield" as used here.

The S.A.F. *Forest Terminology* defines sustained yield as applied to policy or plan of forest management as follows: "(It) implies continuous production with the aim of achieving, at the earliest practicable time, an approximate balance between net growth and harvest, either by annual or somewhat longer periods." The difficulty of being specific and still brief is probably one of the reasons why the term means different things to different people.

For example, nothing is said about a balance of cut and growth by tree species or management units. Consequently, you can still have sustained yield, according to the above definition, even though the more valuable wood is being cut much faster than it is growing and the less valuable wood correspondingly slower. You can also have sustained yield if one section of the forest area is being heavily overcut and the remainder of the area correspondingly undercut.

It should be evident that a cutting plan which permits overcutting of one species or one area and undercutting of other species or other areas is not good management even though cut is in balance with growth for all species over the entire area. Such a plan means trouble in the years ahead for the forest manager. Therefore, sustained yield management, as broadly defined above, does not necessarily mean good management.

Use of the term sustained yield in forestry implies, however, that the ultimate in good forestry has been achieved. As previously noted, this is not necessarily so and, consequently, the definition should be more specific if it is to mean what most people seem to think it means. Therefore, I suggest that the definition be changed as follows: (It) —implies continuous production with the aim of achieving, at the earliest practicable time, an approximate balance, *by species and management unit*, between net growth and harvest, either by annual or somewhat longer periods.

There may be other changes which might improve this definition, but this does seem to define more clearly our understanding of the term.

We believe further that the size of the unit is the key to the problem of growing the most wood and that really intensive management requires sustained yield cutting plans for each individual operation. The most desirable size of operation depends upon a number of factors, but it may be helpful to an understanding of this discussion if we consider the area most desirable from the standpoint of growing the maximum wood.

The most intensive forestry can be practiced on farm woodlots. (This is seldom done, but the opportunity is there.) The reason is that the farmer has long term cutting rights and he can gradually road the area and make all of the timber readily accessible. He can do the work at his convenience and because the area is small and well roaded it is economically possible for him to cover a large part of the woodlot each year and remove trees on the basis of age, condition and stand density. If salvage is necessary it can easily be accomplished.

It is believed that this type of management can increase present growth rates by three times or more and that the sustained growth for large areas of productive forest land, even in the comparatively slow growing timber types in Minnesota and Ontario, can reach ½ cord per acre annually. There are two main reasons why it is possible to manage farm woodlots intensively. These are (1) permanency of operation and (2) development of a network of roads. Therefore, if other operations can be established on the same permanent basis, greatly increased yields are possible.

This is the thinking of our company and as a result our operations are being patterned, as nearly as possible, after this farm woodlot type of operation. The size of these cutting units depends upon existing transportation facilities, type, age and condition of the timber and available labor supply. As we have presently worked this out our cutting units vary from 500 acres for a small settler operation to about 60,000 acres for our larger camp operations.

A discussion of the procedure followed in the development of these cutting plans, the number and type presently in operation, detailed data for a few representative cutting units, and some of the problems and advantages involved in this type of planning are covered in the remainder of this paper.

Development of Cutting Plans

Mills of the Minnesota and Ontario Paper Company are located at Kenora and Fort Francis, Ontario, and International Falls, Minnesota. They consist of both groundwood and chemical plants and manufacture a wide variety of products from newsprint to the higher grades of publication papers, as well as insulite, an insulation structural board. We use over ½ million cords of wood per year consisting mainly of spruce, balsam, jack pine, and poplar or aspen.

At present growth rates we require all of the annual growth on a gross forest area of about 5,000,000 acres. This is 2 to 3 times as much land as needed to grow our annual needs on an area intensively managed. Our objective, therefore, is to concentrate our manage-

[1]Paper presented at the joint S.A.F.-C.I.F. meeting, Montreal, Canada, Nov., 1952.

ment efforts on forest lands close to our mills so that in the future our needs can be grown on the smallest possible acreage and in closest proximity to the mills.

This points up the problem. Before discussing our program for solving this problem, however, it will probably be helpful to note a few of the pertinent facts regarding the supply situation in the area where we operate.

First of all, 75 percent of the forest land in our immediate Minnesota operating area is in public ownership (state, county and federal) and over 90 percent is owned by the Crown in the Canadian areas where we obtain most of our wood. It is evident, therefore, that we are dependent to a large extent upon public agencies for our supply of raw material, that there are certain definite limitations upon what we can and cannot do in the development of a forestry program and that our forestry work must be closely coordinated with governmental programs.

The second point which has a bearing on this problem is the shortage of spruce and surplus of poplar in Minnesota and the present surplus of poplar and jack pine on our Canadian areas. This means that either mill needs in Minnesota must eventually be changed to conform to the quantities of the different woods available in our permanent supply area or the lands now growing species which are in surplus supply converted to the kind of trees which are in short supply. It is important that this problem be recognized far enough in advance so that the necessary changes can be made before it is too late.

In our Canadian areas a large percentage of the forest contains mature and overmature wood and therefore, the present surplus is for the most part of a temporary nature. The problem here is to gradually convert the timber types into a more balanced distribution of age classes. This is also a problem in Minnesota, but to a lesser degree.

These facts of shortages and surpluses and the unbalanced distribution of age classes were brought out in the inventory survey made of the various management districts within our operating area in cooperation with the different governmental agencies. These management districts were established prior to the survey. The initial inventory provided the basic information needed to start sustained yield management for the district as a whole. It indicated the areas in greatest need of attention, how much timber should be cut during the first stage of management, how the area could be broken into cutting units, and the cut by species which the entire area could probably sustain. It did not, however, provide sufficient data for the development of detailed operating plans.

Operating cruises were necessary for this more detailed planning and these were made on each of the preliminary units established from the initial survey. After completion of the more detailed cruises, each cutting unit was finally established and a five-year operating plan developed. Wherever possible, each cutting unit has been established as a permanent cutting area for one type of operation and the allowable cut based upon the productive capacity of the area. In many areas the older age classes predominate and this has been taken into account in setting up the allowable cut. However, major emphasis has been upon keeping the initial cut low enough so there will always be sufficient timber in the area to justify an economic and continuous operation.

As noted earlier, these cutting units vary in size from about 500 acres to 60,000 acres. The size of the unit depends upon the type of operation which seems most adaptable to the area in question. This is determined largely by the existing roads, water routes, etc. Areas close to main roads lend themselves best to small settler type operations whereas more inaccessible areas are better adapted to larger camp type operations. This is our basis for deciding upon the size and type of cutting unit, but regardless of this variation, detailed five-year cutting plans have or will be prepared for each one of these units and wherever possible each one is established as a separate sustained yield unit.

Sustained Yield Units

In Minnesota our most important supply area has been broken down into five management districts and in Canada we have four pulpwood concessions, each one corresponding to a management district. After the initial survey previously discussed each one of these districts was divided into cutting units. This work is not yet complete, but a good start has been made.

In Minnesota about 30 sustained yield units have already been established and our present estimate is that this is about one-half the number that can be developed. These vary in size from 500 acres to 40,000 acres and the annual cut for the first period of management varies from 50 cords to 7,000 cords. About one-half of the 30 units are settler operations and the remainder is handled by small contractors. The average annual cut for the settler operations is 400 cords and for the contractor operations 3,000 cords. These sustained units supply, at the present time, about 50,000 cords per year or 20 percent of our Minnesota needs.

In Canada our limit wood is cut by small contractors and company camps. Five-year operating plans have been completed or are nearly complete for about two-thirds of the concession areas. To date, 22 sustained yield cutting units have been established and these vary in size from 20,000 to 60,000 acres. The average size is 36,000 acres. The annual cut for the first period varies from 2,500 cords to 20,000 cords and the average is 7,800 cords. A total of about 170,000 cords of wood annually or 50 percent of our Canadian production comes from these sustained yield units.

Detail of a Few Representative Cutting Areas

So far in this discussion we have

noted that our company uses in excess of 500,000 cords of pulpwood annually, that about 50 sustained yield cutting units have been established and that these units will supply about 220,000 cords of wood yearly, or roughly, 40 percent of our present needs. When our cutting plans are all complete, it is estimated that we will obtain about 50 percent of our total needs from areas established on a sustained yield basis.

Before discussing some of our specific cutting areas a few points should be noted as follows: First of all, in Canada we have long-term cutting rights and are requested by the government to develop cutting plans, although the exact type is not specified. In Minnesota the company owns in fee fairly large blocks of timberland, but over one-half the land within our cutting areas is under state control and the company can obtain only short term cutting rights on this land. Therefore, in developing plans in Minnesota it is necessary that they be closely coordinated with the state's plans, but this is complicated by the fact that the state sells most of its timber at auction sales on two-year permits. Consequently, it is difficult for the company to make definite long-term plans in areas where it does not control sufficient timber to justify development of these areas. Because of the limited contract period for state timber, many timbered areas are not being developed as fast as they should be in order to obtain maximum yields.

In spite of this handicap, the company has gone ahead with its planning and taken the chance that it will obtain most of the state timber within the cutting areas in cases where it has sufficient timber of its own to justify the major part of the development cost.

These permanent cutting areas can be broadly classified into three types: (1) small settler operations, (2) medium sized contractor operations, and (3) larger sized company camp operations. These different classes vary only in amount of wood produced and number of men employed, but they are all established for continuous production and patterned after the farmer woodlot-type of operation. In the settler operation the area is set aside for a farmer, preferably one living near the area, and he commutes back and forth from his farm. In the contractor and camp operation a camp is usually centrally and permanently located and the workers travel by car, truck or bus, or they walk, if the distance is not too great, to and from the cutting area. In areas where road building is difficult and expensive the camps are more portable and will be moved at about 10-year intervals.

Examples of a few of these classes of operations are covered below.

Small Settler Operations.—One of our small settler operations is located along State Highway No. 11 about 20 miles southwest of International Falls. The company owns a contiguous block of timber here about 1,200 acres in size which has been set aside as an experimental forest. It has also been set aside as a farm woodlot for a local resident who lives within two miles of the area, with the understanding that he can have whatever off-season employment is available in the form of harvest and improvement cuttings, disking, planting and other silvicultural jobs.

This settler and his son are now starting their fourth season of work on the area. Because the main roads were in and the company tapped the area in several places with logging roads, the settler did not have to make any appreciable investment in equipment. He uses a power saw for cutting, a small tractor for skidding and a bob-tail truck for hauling.

The total merchantable timber on this area is about 13,000 cords of pulpwood and 1,400,000 feet of hardwood sawlogs. The merchantable types average 16.3 cords per acre and 1,400 feet of saw-timber. About 5,000 cords of pulpwood is in the mature and overmature classes and the cutting plan calls for a higher cut during the first stages of management than the area can permanently sustain in order to salvage as much of the older wood as possible before it deteriorates further. Consequently, the cut for the first five years was set up at about 600 cords annually. For the second five years this will be reduced to about 400 cords annually and this is considered about the sustained cut for the area. However, it may be necessary to reduce this somewhat after the ten years to permit the young stock to build up before the estimated future cut of 400 cords can be sustained.

During the first five years the plan is to cover the area as completely as possible, removing those trees which are oldest and deteriorating most rapidly. This would be considered a very costly operation except for the fact that the operation is a permanent one, the main roads are in and the cost of the logging roads can be spread over a long period and, as a result, a large volume of wood.

One of the major problems in maintaining the maximum productive capacity of any area is the establishment of a new crop of timber after the old one has been removed. In this particular area all of the old cut-over areas which did not restock naturally are being planted, but in the future it is expected that through careful cutting a new stand will become established before the old crop is entirely removed.

This type of operation is desirable for both the operator and the company because it assures him of permanent employment near home in his off season and it assures the company maximum yields and a dependable labor supply, the two most vital factors in providing the mill with its raw material.

Medium-Sized Contractor Operations.—Another example of this type of operation, except on a somewhat larger scale, is an area of 23,000 acres located 40 miles southeast of International Falls, 10 miles from a main state road. This area was established four years ago and has been operated ever since then by a company contractor. Our company owns about one-half the land in this area, on

which there is an estimated 70,000 cords of pulpwood. Most of the remainder of the area is state land on which there is also about 70,000 cords of pulpwood, making a total of 140,000 cords for the unit.

In the development of this area about 10 miles of main road was constructed or improved and a modern camp built in a central location as a permanent establishment. Expenditures totaled about $80,000 the first year for the main road, camp and winter haul road. The road system is being extended each year and within a short time all of the timber types will be readily accessible. As in the farm woodlot, trees can then be cut on the basis of age and condition, damaged timber can be salvaged and the area managed intensively for maximum yield.

This large initial investment could not have been justified except for the fact that the company owned a large block of timber in the area. We expect to buy the state timber in this area. As previously noted, at present this can only be purchased on short term contracts. Because of the large block of timber in company ownership, it was easier to plan for permanent operations and the camp constructed built on a more permanent basis. The camp cost over $50,000 and is considered one of the best and most modern in the region. The operation is planned for about 10 months each year and this steady employment plus good living conditions assures a good supply of labor as well as maximum yields.

One of the greatest difficulties in establishing continuous operations in most of our cutting units is the preponderance of mature and overmature wood. This area is no exception, with 60 percent in these two classes or approximately 85,000 cords. It is necessary because of this to cut more than the area will sustain during the first stages of management in order to salvage as much of the old timber as possible. The plan calls for cutting about 7,000 cords annually during the first 10 years or until most of the mature wood has been cut. After that the cut will be reduced to what the area will permanently sustain. At present it is estimated that growth will amount to about 5,000 cords per year or about one-quarter of a cord per acre annually.

Cutting plans for the other areas established for sustained yield are all much the same as the two examples cited above, except that in Canada the development cost is much greater, but so is the volume, and the cut for each operation is somewhat higher. However, for most units the annual cut is between 6,000 and 10,000 cords. The problems vary with the extent of control of the lands by the company, the accessibility of the areas, and the distribution of age classes. However, in all cases adjustments are made with the aim of insuring continuous production and maximum yield.

The Problem of Too Much Old Wood

As previously noted, one of the most difficult problems in the establishment of small sustained yield units is the preponderance of mature and overmature wood. When this old wood consists of poplar or jack pine the problem is more acute because of rapid deterioration of these species after maturity.

In each unit where this situation exists, and it does in most areas when first placed under management, the question as to why all of the old timber should not be cut as fast as possible is raised every time this matter is discussed. This questioning is not limited to only those in management who are primarily concerned with costs, but it is also a matter of considerable disagreement among foresters. For this reason, and because the maintenance of a fairly uniform and continuous cut in each sustained yield unit is of major importance to the success of small permanent operations, I would like to discuss why prolonging the cut of this old timber is considered necessary in the initial stages of management, and why it will cost no more in the long run than heavier cutting over a shorter period.

In analyzing this problem there are two basic facts that must be known: (1) whether or not the species in question is in surplus or short supply and (2) the rate of deterioration after the stand has reached maturity.

In our general area both jack pine and poplar are growing faster than they are being cut. The mean annual increment of both species culminates at about 50 years on an average site and mortality starts to exceed growth after 80 years. Spruce, on the other hand, is in short supply, reaches its growth peak at about 100 years, but mortality does not exceed growth until after 150 or 160 years. This means that 100-year old spruce can be held for 50 or 60 years before any appreciable volume loss occurs and that 50-year old poplar and jack pine can be held for about 30 years before mortality exceeds growth.

With these facts in mind let's consider again the small contractor operation previously discussed. The allowable annual cut established for this area was 7,000 cords for the first ten years. The area contains about 85,000 cords of overmature wood, mostly poplar and jack pine. This timber is presently about 75 years of age and there will probably be a loss in net volume after it exceeds 80 years. Therefore, instead of cutting only 35,000 cords for the first five years why not cut the 85,000 cords of mature wood? This would require an annual cut of 17,000 cords per year or 10,000 cords more than planned.

First of all, it should be remembered that there is an oversupply of these two species and if more wood is cut in this particular area less wood will have to be cut in some other unit. Consequently, as there is overmature wood in most of the units, it makes no difference insofar as loss in volume is concerned whether the poplar and jack pine required is all taken from one area or a number of areas.

On the other hand, if this area were cut at the rate of 17,000 cords per year for five years it would

then be necessary to reduce the cut to about 2,000 cords per year during the period required for the younger timber to grow to maturity. This low a cut would not be an economic operation there and, consequently, the camp and roads would have to be abandoned for 50 years or more and by then the area would be in the same condition that it is now, with too much old wood. This practice, therefore, works against maximum yield and encourages a system whereby the forest areas would never have a balanced distribution of ages or provide high quality wood.

Because spruce maintains its volume for 50 to 60 years after reaching maturity, no loss in volume is incurred if the cut of this species is prolonged over a long period of time. Therefore, in the interest of permanent operations, maximum yield, and high quality wood, it seems desirable to maintain the cut of this species at about the rate the unit can continuously sustain.

This is now our company's policy and all of our areas will be developed in this manner as rapidly as possible so long as economic conditions are such that we have the capital to expend for the major development work required in opening up new areas.

Advantages of Sustained Yield Units

What are the advantages of this kind of program? It is, of course, extremely difficult in these times to attempt to say with assurance what may develop in the future. However, it seems certain that the great forests of the United States and Canada will increase in value more rapidly in the future than they have in the past and become of even greater significance to the economy of our respective nations and the world. You do not have to be an expert with a crystal ball or even have an unusual amount of imagination to predict that the forests of North America, which comprise about one-fifth of the total forest area of the world and contribute nearly 70 percent of all wood pulp produced in the world, will be of ever-increasing value if they are properly managed. Further evidence of this is the expert opinion that we are barely into the coming age of wood and that wood chemistry is little more than an infant in the industrial revolution that has transformed the lives and thoughts of people throughout the world.

If this is not too optimistic a picture, and many world experts have testified that it is not, then it can be said with great certainty that forest areas now being managed for sustained yield, areas where the growing stock is build-up, where maximum yield and high quality wood are the conscious foundations of management policy, are areas which will pay tremendous dividends in terms of low cost wood in the years to come. Whether this great potential value will be realized 10 years or 25 years from now may be open to argument, but there should be no argument about the eventual result.

The number one advantage of planning for sustained yield is, therefore, lower cost wood in the long run. Before leaving this point, just a word about the term "long run." Many people feel that any period beyond five years is long, but in the life of a tree or a 25-million dollar pulp mill it is very short. The major reason why there has been such a spurt in industrial is because of the recognition that high cost wood pulp manufacturing facilities cannot be moved when the supply of raw material gives out and, therefore, a sustained supply of wood is essential to sound financing. For this reason it is of great importance to plan for an assured supply of wood, not only for the next 15 or 25 years, but the next 50 or even 100 years. The mill that gives realistic recognition to the future will have a tremendous advantage over those mills that hope the supply will take care of itself.

Lower cost wood is the ultimate goal of this type of planning. But what are the factors that will tend to lower costs? The major ones compared to the system of large camps of short duration are:

1. The cost per cord of major development items such as camps, roads and river improvements will be less because these facilities will be of permanent use and in the long run service a larger volume of wood.

2. Better planning is possible in an area established as a continuous cutting unit. The complete road system can be laid out so that each piece of road will serve the maximum volume of wood. Equipment needs can be better determined by an operator who knows where he is going to operate and the approximate size of the job several years in advance.

3. After the major development work is complete, annual expenditures for extensions, maintenance and improvement of these permanent facilities will be much lower and more uniform as contrasted to the old "cut and move" system where large expenditures must be made every few years forever for new camps, main roads, etc. However, after these permanent units are all established it will be possible to curtail all development expense, if necessary, during periods when mill needs are small because road systems will be built ahead of operations and the required mill needs can be obtained from the areas already developed.

4. A more stable and dependable labor force can be developed on this type of an operation. This will result in less turnover and and, as a result, less camp overhead expense per cord of wood produced.

5. Higher quality wood and much greater yield per acre will be obtained in the long run. Eventually each one of these units will have a balanced distribution of age classes and trees can be cut when they reach their peak in growth, but before they start to deteriorate. This, in itself, will greatly increase yields but, in addition, more thinning and salvage cutting will be economically feasible in this type of operation and further increase growth rates and total usable volume. As a result, less wood will have to be obtained from high cost freight areas long dis-

tances from the mill. In addition, the supply from these areas will be more secure.

There are, of course, some immediate disadvantages to this type of operation such as the higher cost of going longer distances to and from work, increased road maintenance and snow plowing and more careful (therefore more costly) cutting. These, however, are considered insignificant in balancing them against the many real advantages of permanent operations.

Summary

1. Sustained yield management as applied to operations of the Minnesota and Ontario Paper Company means continuous production and balancing cut and growth by species and individual cutting unit as soon as possible, usually no longer than ten years.

2. The farm woodlot type of operation is considered an ideal from the standpoint of growing the maximum wood because of its permanency and accessibility. With this type of an operation it is estimated that present growth rates can be increased over three times and that the mean annual increment for large areas of productive forest lands, even in the comparatively slow growing timber types in Minnesota and Ontario, will reach nearly one-half cord per acre annually. Therefore, the operations of our company are being patterned, as nearly as possible, after this farm woodlot type of operation.

3. To the present time fifty-two of these sustained yield units have been established—thirty in Minnesota and twenty-two in Canada. They vary in size from 500 acres for a settler operation to 60,000 acres for a large company camp operation. The allowable annual cut varies from 50 cords to 7,000 cords per unit in Minnesota and from 2,500 cords to 20,000 cords in Canada. The fifty units will support a cut of about 220,000 cords yearly or roughly 40 percent of present company needs. Eventually we expect to have enough of these units to supply about one-half of our requirements.

4. These cutting units are divided into three types of operations: (1) small settler operation, (2) medium sized contractor operation and (3) larger sized company camp operation. The different classes vary only in the amount of wood produced and number of men employed, but they are all established for continuous production.

5. One of the most difficult problems in the establishment of small sustained yield units, or for that matter placing any unmanaged forest under management, is the preponderance of mature and overmature wood. However, at the expense of holding wood well beyond its peak in growth and a possible loss in volume, the cut for all of our units is held down in the interest of continuous operations and to avoid the necessity of abandoning camp and road improvements. This is done so as to convert as rapidly as possible to a balanced distribution of ages in each cutting unit.

6. Lower cost wood is the principal advantage of this type of planning. It may take some time before the potential value of sustained yield cutting is fully realized, but on the premise that wood will be more valuable in the future, and all recent trends support this view, the eventual advantage to those mills starting now to grow the maximum volume of high quality wood close to their mills, cannot be doubted.

Comments

William J. Brown
Asst. chief forester, Kimberly-Clarke Corp., Neenah, Wis.

I would first like to offer a few remarks on our local settlers. We have always considered them to be farmers who needed extra income during a part of the year. This has been proven to be wrong. Many of the farmers have eked out an unsatisfactory living for awhile and then abandoned their farms for higher wages in the mines and the defense plants.

In the Lake States, at least, we need to turn our thinking around; we should think of our settlers as woods workers. They should be encouraged to work in the woods at good rates of pay and their farming activities should be subsidiary to the woods work. Our company encourages workers to stay with us and thereby builds a source of permanent woods labor.

The fact that I have been asked to comment on George Amidon's paper does not imply that I am critical of his planning operations for we must encourage good planning to reach our management objectives.

When we start out to manage a "wild" forest are we always sure of what we are trying to do? Are we going to manage the property to renew the growth and volume that is now on it? If we are, we can say we are on sustained yield from the beginning. If we are not going to increase the growth rate appreciably, or if we are not going to build up the growing stock, we cannot expect to reduce the operating area too much, either. We in the United States have been misled by rosy claims of sustained yield

under a system that undercuts the growth.

On the other hand, if we set out to build up the growth and the growing stock on a concentrated portion of the total area we should not claim to be on sustained yield until our forest has reached its "sustaining volume limit." We are headed toward this goal, but we do not have adequate terminology to describe our method of reaching it. Can we call it a system of forest management by increase?

George Amidon's management problem is the continuous production of 500,000 cords of wood annually. He is making decisions now that will determine the acreage necessary to produce this wood volume. His choice of operation should be dedicated to the production of the maximum volume of desirable wood on the minimum area of land. All of his planning and all of his operations must take into account the silvicultural practices necessary to keep his forest producing desirable pulpwood. He must, therefore, depend upon a distribution of age classes by area. I believe the minimum area upon which he can do this successfully will be found to be about 100,000 acres in size for wood grown on a long rotation. Perhaps 50,000 acres will suffice for his production of short rotation wood. Each area will then contribute to the over-all requirement of this management when the cutting budget is allocated to each one.

North American forests are rapidly becoming dynamic areas of production. Their static condition is done away with as soon as the old growth volume is removed. New growth of wood is then accumulated for use by the converting plant to which the forest is tributary. For, it must be remembered, if there is no conversion, there is no need for management, but merely custodianship by the owner.

Doesn't this point to the trend of North American forestry? If we try to pinpoint this trend, could we say it is the intensive development of forest resources for use by increasing cultural population? Contrast this trend upwards to 400 pounds per capita of wood fibre products on this continent with the 2½-3 pounds in Asia. The forests in that region furnish only a small part of the peoples needs—mostly for fuel and primitive shelter.

We need to keep the trend of forest management focused in the right direction. If we need new terminology to describe what we are doing let's get busy and design the words to express our dynamic forestry practices.

PROGRAM COMMITTEE in charge of the Fourth American Forest Congress called by The American Forestry Association, October 29-31, in Washington, D. C., will be, left to right: Dr. Ira N. Gabrielson, president, Wildlife Management Institute; Lowell Besley, executive director-forester, The American Forestry Association; Hardy L. Shirley, dean, College of Forestry, chairman of the committee, State University of New York; Leo V. Bodine, executive vice president, National Lumber Manufacturers Association; E. W. Tinker, executive secretary, American Pulp and Paper Association; and E. L. Demmon, director, Southeastern Forest Experiment Station. A seventh member of the committee not shown in the photograph is Joseph F. Kaylor, director, Maryland Department of Forests and Parks. From 800 to 1000 people are expected to attend the first national town meeting of forestry since 1946 at the Statler Hotel in Washington in October. Agenda for the Congress was set up in June by representative leaders in the field of renewable natural resources who met at Higgins Lake, Michigan, to draft a revised Program for American Forestry. Following the Congress where the Higgins Lake recommendations will be considered, the Board of Directors of the AFA will adopt a revised Program for Forestry. This program will be submitted to the Association's membership for referendum.

The Role of Wood Utilization and Similar Curricula in Forestry Education[1]

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The title of this paper appears to indicate some uncertainty as to the term to be used to designate the area of knowledge concerned. Today the term wood technology is being employed to a constantly increasing extent to cover this field. Mention of this is made to clarify the meaning of the expression as it is used in what follows.

In the past the meaning of the term has unfortunately been artificially restricted at many schools of forestry, perhaps because of the very limited subject matter in this department which their curricula contained. Where just a few courses were offered, the misconception easily arose that they adequately covered the field; that, indeed, they constituted wood technology in toto. This conception is somewhat analogous to saying that one leg of a table is the whole table.

In its modern connotation wood technology is concerned with the application of science to the business of wood utilization. It might perhaps be said to be any and all scientific knowledge relating to wood, with special emphasis on the practical application of that knowledge in industrial utilization. It is therefore a very wide territory, beginning with minute structure and the factors affecting it, ranging through the physics, chemistry, mechanics, pathology of wood; extending through drying processes, machining, adhesive bonding, mechanical fastening, modifying treatments or processes of all types, derived products, and current practice in the various stages of manufacture ending with the finished product. Obviously many lines of specialization are possible and necessary within the boundaries indicated.

If the subject under consideration is to be discussed with a proper sense of proportion, cognizance must be taken of another fact. Time was, and still is in some institutions, when the attitude towards wood technology was rather like that of an older, towards a much younger, brother—patronizing tolerance. This was understandable when information and publication in this field were meager, when research appeared insignificant, and when requests from industry for technical assistance were infrequent. Today such a position is entirely untenable. The body of wood technology knowledge has reached impressive proportions. It is rapidly expanding. There never was a time when research relating to wood and wood products was advancing with such strides and along so wide a front, or when the endeavour to further industrial application of its findings was more in evidence. The existence of the Forest Products Research Society, with its large and steadily growing membership is symptomatic of the general trend. Progressive groups in the wood industries which, ten or fifteen years ago, were not spending a penny on research are now expending thousands of dollars annually in investigative work. Outstanding individual firms making wood products have set up, or are planning, facilities for study of their output or for the development of subsidiary products. There is a growing interest in the formulation and adoption of effective acceptance or control tests or measures, in line with current procedure in other industries. The number of technical inquiries pertaining to wood reaching research agencies is large and is steadily increasing. Wood technology is, in fact, already of adult stature.

Several questions, arising out of the foregoing, are of direct interest to forest schools, the principal agencies at present undertaking the training of men to function in technical capacities in the wood industries. The first of these is—does industry need wood technologists? If we rephrase this to ask—can industry operate without wood technicians, the answer is yes. But careful study of the situation has disclosed ample evidence to show that technical advances, with the important contributions towards improvement of products, reduction of costs, and promotion of business to which they give rise, are much more rapidly achieved in the industrial plant with the aid of good wood technologists than without that aid. Now if this observed fact is coupled with the constant and impressive progress of research and investigation relating to wood already stressed, it is obvious that industry needs wood technologists—men who can form an increasingly effective link between research on the one hand and practical application of its results on the other.

After personal contact with a variety of wood industries over a good many years, frequently with reference to difficulties of a technical nature actually encountered in the day to day work of manufacturing plants, the need for qualified technical assistance has forced itself on my attention scores of times. These difficulties are, in the last analysis, nearly always reflected in increased production costs in one way or another. If they can be prevented or minimized, costs are reduced. Adhesive bonding alone is a prolific area for the occurrence of these problems and may be cited as merely one department of many in which a man with adequate wood technological grounding can render valuable help. Then there is the whole matter of assessing or developing new processes, equipment, or products in which, again, a competent technical man can effectively cooperate. It is believed that the need of industry for wood technologists is indisputable. It is pertinent to add that such need may, or may not, be realized by management.

[1]Paper presented at the joint meeting S.A.F. C.I.F., Montreal, Canada, Nov., 1952.

Following the inquiry as to need, is the question—does the wood industry want wood technologists? In twenty-odd years of training men to function in technical capacities in the wood industries at the University of Michigan, we have consistently found, in war and peace, in good times and bad, that the demand for such personnel has always been greater than the supply we had to offer. Over that period the instances in which a good man found extreme difficulty in securing employment have been few indeed. Any such case was usually due to factors entirely apart from the man's technical qualifications for the work.

What has been said above should not be construed as implying that all sorts of good jobs in this field are going begging. But, aside from the active or expressed demand, there are many cases in which the want for the type of technical man in question is potential but can be converted into the actual by proper tactics. It is not within the scope of this paper to consider procedures, "do's" and "don'ts" in job getting by wood technologists, or the part which can be played in this direction by faculty members or personnel placement officers at universities. This aspect of the situation is naturally of vital moment to those directly concerned and merits separate and detailed discussion. Also it would be trite, but extremely pertinent, to remark that one of the major factors involved is the job hunter himself, his personality and his record to date.

Suppose a well trained man, who has recently graduated in wood technology, and who can furnish good recommendations, is looking for employment. He makes a round of calls on a number of plants. He will encounter plenty of people who will not have the least idea what he is talking about when he mentions the type of training he has received, or who will be skeptical, indifferent, or even antagonistic. But he will also find others who will understand very well and who will be ready to listen to what he has to say. He may have to put up a good sales talk to interest the particular management in actually offering him employment but if he persists he will secure it in the end. The more the university has paved the way, of course, the easier his task will be.

Do students seek training in wood technology? Experience in the United States shows clearly that they do, and they will, as soon as they become properly informed as to what wood technology is, what opportunities it has to offer, and that really good training and facilities exist for preparing men to enter this professional field. The reputation the particular university establishes in this department of study, its personnel and facilities, its research and instructional rating, have, of course, a strong bearing on the extent to which students will seek enrollment in wood technology courses.

It has been stressed that wood technology is a wide and expanding field within which there is obviously room for specialization in many different directions and which offers growing opportunity for professional employment. If education in wood technology is to measure up to the demands of the situation it must reach a high standard. It must emphatically be on the professional, not the vocational, level. It must foster and keep pace with research and must also be alert to important shifts in methods or policy, or emphasis within industry, which are brought about by economic conditions, new scientific developments or other causes.

It is certain that adequate preparation of men to function successfully in technical and executive capacities in the wood industries cannot be given by slightly modifying curricula ordinarily used for the training of foresters or by adding a course or two to such curricula. The man thus trained is primarily and essentially a forester, but the man the conditions demand is one who is primarily and essentially a wood technologist. Only curricula distinct and separate from those for forestry can satisfy the requirements.

A school of forestry embarking upon the project of turning out wood technologists would, in practically every case, have to add to its staff men specially qualified to present many of the courses necessary; for example, adhesive bonding (an extensive and quite complex subject in itself), or machining — from the scientific as well as the production standpoints (another large subject), or kiln drying (a field in which research is constantly moving). The establishment of a strong separate department of wood technology within the school is indicated as the ultimate and logical objective if maximum effectiveness in instruction and research is to be attained.

We might next inquire—what should curricula in wood technology include? Curricular content is, of course, always controversial.

There is probably no serious disagreement, however, regarding the fundamentals to be required of wood technology students during the first two years of their university work — a good grounding in mathematics, physics, chemistry, English, economics and so forth. It is regarding the content for the years beyond that controversy mainly arises. Even here there would be general concurrence as to courses covering such ground as wood structure and identification, with differences of opinion on details or intensity.

In considering our question it should be borne in mind that the large and growing fund of scientific knowledge relating to wood and its utilization makes it incumbent upon departments of wood technology to break new ground in their instructional area to build up-to-date educational structures. In practice this may mean that the question of whether or not to require this or that forestry course in their curricula may have to be answered differently today than, say, ten years ago. Because of time limitations, definitely requiring such a course now may exclude from the curricula some other

course much more vital to the student's professional equipment. Dendrology may be cited as an example. If it should come to a choice between this subject and, say, design of woodworking machinery, I personally would vote for the latter without hesitation.

Without detailing everything which, in my view, should be included in a wood technology curriculum I should like to mention a number of subjects which, I am very sure, should not be omitted or given cursory treatment. Courses in structure and identification should include microscopic identification and sub-microscopic structure. Presentation of the physics of wood should include good laboratory coverage dating as closely as possible to current research findings. A course on the chemistry of wood and derived products should follow a preparatory course on organic chemistry. In an age of creative chemistry this subject is yearly becoming of greater moment to the wood technologist in a variety of ways. A course on the pathology of wood, from the products standpoint, should be provided for wood technology students. A course sequence in timber mechanics should introduce the student to strength of materials as well as giving fully detailed treatment of the strength of wood. It should also familiarize him with stress grading. The basic technology of mechanical fastenings for wood—nails, screws, bolts, connectors, should be presented. Instruction in the technology of wood drying should take cognizance of certain special methods which may be modified by research to the point of practical usefulness and also of the high velocity circulation methods of European origin, recently introduced. The technology of adhesives and adhesive bonding for wood should be given adequate attention. This is a large, complex and fast moving field. The machining of wood is a subject wide open for research, and instruction in this direction should be given with careful attention to current investigations and to findings to date. Fire-retardant treatment of wood is currently attracting increased notice. There is much present interest, for example, in fire-retardant coatings. Fire-retardant processing should be given a more adequate proportion of the time devoted to wood preservation courses than it usually receives. Good courses in research methods, report writing, plant management, and personnel relations, should be available and are usually offered at any large university. Of primary importance is a course specially designed to impart a basic understanding of the whys and wherefores of timber production under scientific forestry control and of how that control is exercised. With some few exceptions it is preferable that the material mentioned should be presented by members of the wood technology staff.

Aside from an adequate core of compulsory subjects, considerable flexibility regarding the specific courses required for graduation in wood technology is highly desirable to permit direction of the student's training along the lines of his individual capabilities and preferences.

The next question, and it is one frequently raised, is—in what unit of a university should education in wood technology be centered? The argument here is usually concerned with control by the engineering school versus control by the school of forestry.

Wood technology certainly has common ground with engineering in various directions. For example it is frequently concerned with machinery and is therefore interested in machine design. A man in this field should have a working knowledge of engineering materials in general, and of engineering drawing. He is interested in many kinds of testing and therefore in scientific instruments and measuring devices. It would be quite easy to lengthen the list and to bring forward convincing arguments in support of the contention that wood technology is engineering.

But there are other aspects to be considered. Wood is a biological material. Its properties, within a species, vary to a significant extent with the immediate environmental conditions, which are subject, in an important degree, to control by the forester. The work of the researcher in wood technology is, in numerous instances, closely interrelated with that of the investigator in forestry. Forestry and wood technology must work in unison as a team.

Developments in the industrial utilization of wood can be profoundly influenced by the activities of the wood technologist. These developments in turn affect the value of wood as a raw material. The greater the yield from wood in goods, services and money, the more will the necessity of proper silvicultural and managerial procedures become clear as sound business in order to build up and maintain maximum forest productivity.

In this general connection I should like to cite the paper by Lyle F. Watts, Chief, U. S. Forest Service, presented at the main meeting of the Forest Products Research Society last summer and entitled "Utilization — the keystone of intensive forest management." Almost every paragraph exemplifies and elucidates the close interrelationship and interdependence which exist between wood technological activities and timber production. It is submitted that the tie-up between wood technology and forestry is much closer and more binding than that between wood technology and engineering and that education in this field should be centered in the School of Forestry.

The matter of inviting industry cooperation in the formulation of wood technology curricula is one which may be briefly considered. Due to their experience and inside knowledge of conditions and trends, representatives from industry are often in a position to offer valuable suggestions bearing upon education in this direction. But there may also be a tendency on

the part of industry to fail to recognize fully the indispensability of basic scientific training and to overemphasize the importance of subject matter with an immediate applicability in their business. It must be made clear that, without the basic scientific foundation, the structure of wood technology education is built on sand and that, in the long run, the time spent on a thorough scientific grounding will prove to be a sound investment. It is believed that periodic conferences between instructional staffs in wood technology and representative groups from the wood industries are highly desirable and that, if properly steered, they can be made to serve the best interests of industry, the student and the university.

If the statements made respecting the need and the want for wood technologists are valid they suggest the inquiry—should the output of men with this type of training be increased? Should more universities, especially those having schools of forestry, embark on the enterprise of preparing men for this sort of professional work? The pros and cons to be weighed will differ somewhat from one educational institution to another and no unconditional answer can, of course, be given. At the present time only a very few universities are really well equipped to conduct this kind of education; a fact which may offer encouragement to those considering entry into this instructional field. Staff members with high level ability in teaching and research and with the proper background of experience in wood technology are not easy to find—something of a deterrent. Certain obvious questions would naturally present themselves, such as whether or not the region in which the university is situated is one in which the wood industries are reasonably important, or whether some other university in the area had already organized a curriculum in wood technology. The culminating inquiry no doubt would be—can a strong case be presented to administration to support a request for money to develop the new work?

One thing it is felt should not be left unsaid at this point. If, in the past, graduates who, in actual fact, were not adequately trained in this special field, have found it difficult, or perhaps impossible, to obtain employment in the wood industries, that is no criterion as to the success likely to be attained, in the same quest, by men who are thoroughly prepared.

If a university does decide to organize education in wood technology and if the project is to be successful it is believed that the following requirements, at least, must be satisfied. The instructional staff must be well qualified in all respects; adequate equipment and facilities of good quality and size must be provided; only men meeting a good admission standard must be accepted for training; and sufficient contact must be maintained with industry on the executive level.

White Hollow Watershed Management: 15 Years of Progress in Character of Forest, Runoff, and Streamflow[1]

Jack S. Rothacher
Tennessee Valley Authority, Norris.

Fifteen years of protection and reforestation have so improved the forest cover of 1,715-acre White Hollow watershed in eastern Tennessee that the summer peak flows have been reduced 73 to 92 percent; the duration of summer storm runoff has been prolonged up to 500 percent. A more sustained flow has resulted without any material change in total water yield. The original forest cover has increased in volume from 4,444,000 to 7,104,000 board feet. Natural and planted stands have so controlled erosion on open lands that White Creek now maintains a flow of clear water suitable for rearing trout.

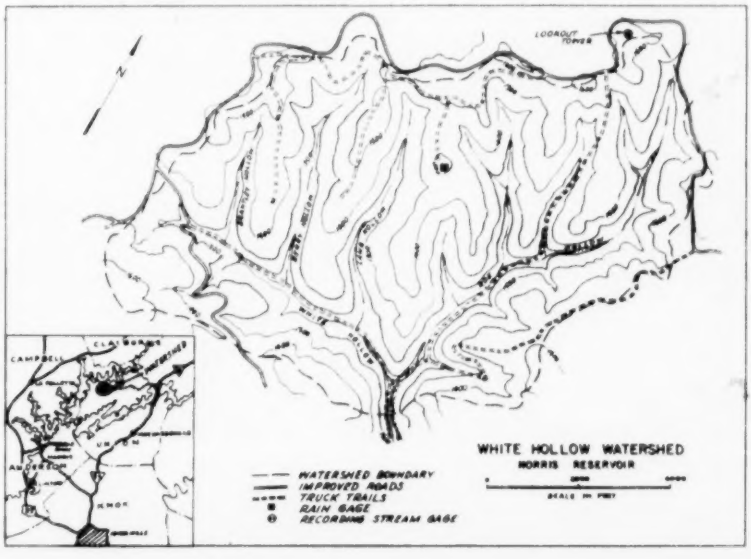
WHEN the Tennessee Valley Authority built Norris Dam, considerable forest acreage was purchased in addition to that which would be flooded. TVA foresters proposed a program of protection and management for these lands. And to measure the effectiveness of the program, an experimental area was set up in White Hollow watershed. These were our specific objectives: to study the changes in vegetative cover on the land and the effect of these changes on runoff and soil erosion. For the past 15 years foresters and hydrologists have kept careful records on the vegetation on this experimental watershed and on the flow of water and movement of sediment in White Creek.

Description of the Watershed

The valley and ridge province of eastern Tennessee is that area between the Cumberland Plateau to the northwest and the Appalachian Range to the southeast. The Clinch and Powell rivers, which drain a portion of this area, empty into Norris Reservoir. Within an area known locally as the Central Peninsula, formed by the confluence of these two rivers, is the site of the experimental watershed. As shown in Figure 1, fan-shaped White Hollow watershed is drained by two main streams which join a short distance above the stream gaging station to form White Creek. White Creek drains southeast into the Clinch from the dividing ridge which is the backbone of the peninsula. Characteristic of the region, a series of steep-sided, parallel ridges form the principal topographic features of the watershed. Slopes average 30 percent. From a maximum elevation of 1,680 feet, the stream channel drops an average of 300 feet per mile to 1,080 feet at the gaging station. Dolomitic limestone outcrops occur on the hillsides, and sink holes are common along the upper edges of the watershed.

When this study was begun, cultivation in the watershed was limited to the ridge tops and easy slopes. There are no large areas of flat land and practically no bottomlands. Maps prepared by the Soil Survey show no first class soils. Only 5.6 and 14.7 percent of the land is in second and third class soils, respectively.[2]

FIG. 1.—Map of White Hollow Watershed.



[1]This investigation was conducted by the Tennessee Valley Authority with cooperation of the Southeastern Forest Experiment Station, Civilian Conservation Corps and University of Tennessee Botany Department. The forestry phase reported on here was the responsibility of TVA's Division of Forestry Relations, Willis M. Baker, Director, Forestry Investigations Branch, E. G. Wiesehuegel, Chief, Forest Management Investigations Section, W. H. Cummings, Chief. Acknowledgment is given to Bernard Frank and Clarence H. Burrage, both formerly with TVA, for initial planning and assistance on this project. The hydraulic phase was the responsibility of the Division of Water Control Planning and is more fully reported in: "Effect of 15 Years of Forest Cover Improvement Upon Hydrologic Characteristics of White Hollow Watershed" by Hydraulic Data Branch, Water Control Planning Division, TVA. Report No. 0-5163. 77 pp. 1951.

[2]Class 1 soils are productive, easy to work, and easy to conserve. Class 2 soils are less productive; they are workable but more difficult to conserve; physically they are only moderately well suited to crop production. Class 3 soils are still less productive and workable; they are suitable for crops but good management must be practiced to conserve them. Class 4 soils are not physically suited to crop production but are suitable for pasture. Class 5 soils are best suited to forestry.

FIG. 2.—A heavy sawtimber stand on the watershed. Volumes exceed 8,000 board feet per acre.

Roane silt loam is found along some of the stream banks; Glendale, Clarksville and Fullerton silt loams occur on the ridges. Steeper and more cherty phases of the latter two soils make up the 7.2 percent of the watershed classified as fourth class soils and the 72.5 percent of class five soils. On the basis of the soil classification, the major portion of the watershed is best suited to forestry.

The climate is favorable to forest growth; many of the more valuable hardwood species reach their best development in this region (Fig. 2). The average annual precipitation is approximately 45 inches, well distributed throughout the year as shown in Table 1. The frostfree season averages 175 days; mean temperatures are approximately 75 degrees in summer and 38 degrees in winter. Rainstorms of high intensity are frequent during the summer months. Snow falls only occasionally; when it does occur, it stays on the ground only a few days.

Although there are no definite records on the early inhabitants of White Hollow, the surrounding country was first settled in 1783. In general, farming was of the subsistence type. Large portions of the watershed have been cleared, cultivated, and then retired. Many of the fields abandoned in the past now support heavy stands of timber. Only 4 percent of the watershed was cultivated in 1936; another 4 percent was in grass; 26 percent was classed as idle. The remaining 66 percent was forest land, much of it subject to fire, grazing, and "high grading." Since these lands became public property they have been protected from fire, grazing, and insect damage. However, several fires have occurred in the watershed. Three incendiary fires in April 1946 burned over 150 acres, including some well established pine and yellowpoplar plantations.

In 1938 and 1939 the Southeastern Forest Experiment Station joined us in a study to determine the forest tree species best adapted to given conditions of soil, slope, and aspect. Forty acres of test plantings in White Hollow watershed, and others in the Norris Reservoir area, provided the basis for deciding what species to use in the watershed. By 1942, 588 acres had been planted—34 percent of the total area. Shortleaf pine, white pine, loblolly pine, and yellowpoplar were planted most extensively. This accounted for all of the open lands except a few acres which contained natural reproduction. Some engineering work was done by the CCC in 1934-35 to control erosion "sore" spots. A total of 145 acres was given treatment as follows:

Masonry dam	no.	1
Log dams	no.	63
Headers	no.	48
Brush matting	sq. yds.	14,459
Bank protection	sq. yds.	11,422
Brush paving	sq. yds.	854
Diversion ditch	linear yds.	42
Trees planted	no.	17,350

After completion of the engineering work, white clover, redtop, and rye grass were seeded to establish a ground cover. Black locust was planted in and along the gullies, shortleaf pine on the adjacent areas. This combination of vegetal and engineering control proved quite successful (Fig. 3). After 15 years, check dams are still in good condition. Together with a well-established forest cover and an effective layer of litter, they have permanently established the banks and channels of the drainages treated.

TABLE 1.—PRECIPITATION, RUNOFF, AND EVAPO-TRANSPIRATION LOSSES FROM WHITE HOLLOW WATERSHED[1]

	Precipitation	Runoff: Ground water	Runoff: Surface	Runoff: Total	Evapo-transpiration and other losses
			Inches		
Monthly averages					
January	5.10	1.36	1.27	2.63	2.47
February	4.72	1.72	1.22	2.94	1.78
March	4.70	1.99	1.30	3.29	1.41
April	3.35	1.53	.62	2.15	1.20
May	3.28	1.03	.24	1.27	2.01
June	3.42	.65	.12	.77	2.65
July	4.90	.57	.23	.80	4.10
August	3.63	.49	.06	.54	3.09
September	2.20	.37	.06	.43	1.77
October	2.42	.39	.04	.44	1.98
November	3.56	.45	.12	.56	3.00
December	3.88	.67	.34	1.01	2.87
Annual averages					
5-year periods:					
1935-1939	47.30	12.29	6.42	18.71	28.59
1940-1944	42.79	9.48	4.34	13.81	28.98
1945-1949	45.38	11.88	6.11	17.99	27.39
15-year period:					
1935-1949	45.16	11.22	5.62	16.84	28.32

[1]Based on 15 years of record, 1935 to 1949 inclusive.

A road system provides easy access throughout the watershed. It has been maintained with minimum disturbance of cover and minimum roadbank erosion. The main access road for the Central Peninsula was relocated outside the drainage. Logging has been limited to a small acreage of private land, and a salvage operation. An outbreak of the southern pine bark beetle in 1947 required the salvage of approximately 300,000 board feet of infested timber from 25 acres in the Lamb Hollow portion of the watershed. This stand, which orginated on an old field, was a mixture of shortleaf pine and yellowpoplar. It was one of the finest stands in the watershed. Volumes before cutting ran as high as 25,000 board feet per acre.

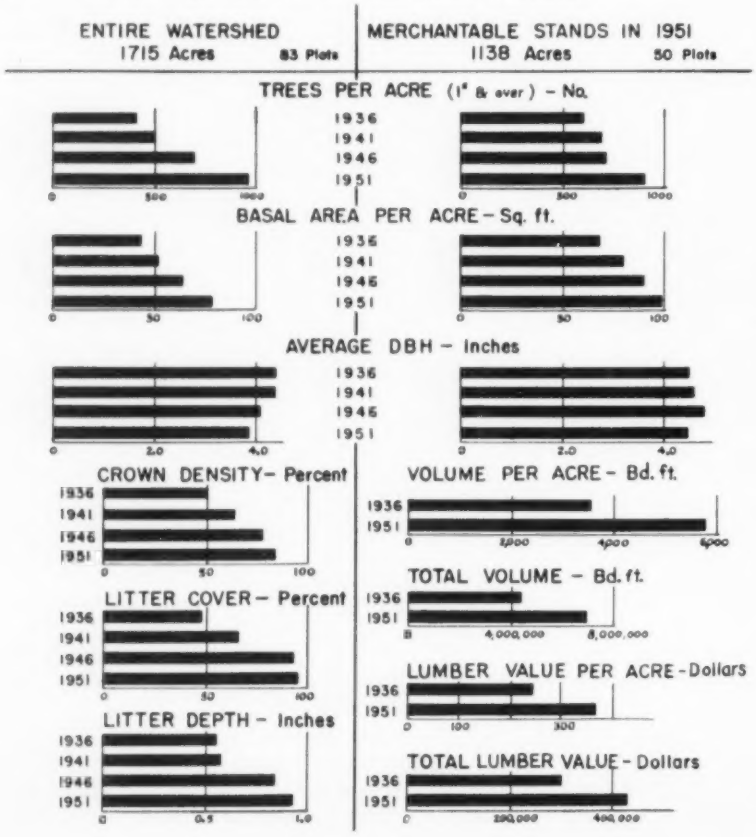
Changes in Vegetation

Vegetal change was measured on 83 permanent sample plots. These square, one-tenth-acre plots were located at 10-chain intervals along east-west lines spaced 20 chains apart—giving a sampling of ½ percent. First measured in 1936, the plots have been remeasured at five-year intervals. Changes in the cover on all plots, and on those in the present merchantable stands, are illustrated graphically in Figure 4. For the entire watershed the sample plots show a progressive

FIG. 3.—Check dams and vegetation have successfully controlled erosion in White Hollow Watershed.

increase in number of trees over one inch d.b.h. for each five-year period. Basal area, crown density, and litter coverage and depth have also increased. Average d.b.h. decreased 0.5 inch during the 15 years. This indicates that a large number of small trees became established and exceeded the one-inch d.b.h. limit within the past two five-year periods. Most of the planted trees are now in the sapling size class; a few of the loblolly pines have reached the small sawlog class (8 inches).

FIG. 4.—Cover changes from 1936 on White Hollow Watershed.



Stands that were merchantable by 1951 show a similar increase in tree number and density. No planting was done here. The large increase in number of small saplings occurred principally during 1946-51, indicating that natural reproduction is well established. The volume and value of these merchantable stands were estimated in 1951. All merchantable trees on the 50 sample plots were graded, volumes estimated and growth borings taken (Table 2). With an average growth of 156 board feet per acre per year, the total sawtimber volume increased from 4,444,000 board feet in 1936 to 7,104,000 board feet in 1951. The lumber values represented by these volumes are $281,400 and $425,500.[3] That means an increase of $8.44 per acre per year.

From a hydrologic standpoint, the most important changes in vegetation have taken place on the areas that are still not merchantable. Fifteen years ago they were open, just out of cultivation or pasture. From them, runoff was most rapid, soil loss greatest. Studies of vegetation on quadrats revealed the natural ecological succession that occurs when cultivation stops.

The first vegetation consists predominantly of annuals and might be called the first weed stage. This is followed by perennials, such as broomsedge, greenbriar, blackberry, and other shrubby growth. Then woody plants take over; dogwood, persimmon, shortleaf pine, and yellowpoplar begin to assert their dominance. The rate of succession is of course variable. The period from abandonment to broomsedge may take up to five years for cultivated fields, somewhat less for pasture. Seriously eroded sites may progress much slower. The tree planting on most of the old fields served to establish valuable timber-producing species and speed up the process of reforestation. The first stages that provide ini-

[3]Values were computed from a quality index for each grade and species, based on February 1951 prices for rough green lumber, Knoxville, Tennessee.

tial cover for the exposed soil proved most important in controlling rapid runoff. Succeeding stages brought about a steady improvement in water control, but the change was less spectacular.

Hydrologic Changes

Although rainfall infiltrates rapidly into soils like those found in White Hollow watershed, the rates may vary greatly with land-use practices. This was brought out by infiltration tests made in 1937 on 28 plots. The infiltrometer used had a surface area of one square foot, to which water was applied under a positive head. The results (Table 3) indicate that infiltration was greatly increased for the more advanced stages of vegetal succession, and was retarded by burning.

Aside from their effects on infiltration, changes in the vegetation have resulted in other significant hydrologic changes. Runoff has been measured by weirs installed in White Creek—a year-around stream. The original rectangular weir constructed in 1934 had a long level crest of 15.17 feet. It did not give the sensitivity required to record streamflow changes during the years. Therefore it was replaced in 1948 by a modified Albany weir calibrated in the TVA Hydraulic Laboratory. The present weir, the gaging house, and the automatic sediment sampler are shown in Figure 5. This installation has a capacity of 240 cubic feet per second, which is about equal to the second highest recorded discharge on the stream. The precipitation, runoff, and evapo-transpiration plus other losses are summarized in Table 1. The rainfall, generally well-distributed throughout the year, shows a slight peak early in the year and a secondary peak around July. Runoff likewise follows an annual cycle, reaching its maximum in late winter or early spring, and its lowest ebb in September and October when rainfall is also low. Evapo-transpiration losses are high during the summer when growth of vegetation is most active. A later secondary high appears from November to January when evapo-transpiration losses are low. This must be attributed to the "other losses" that include satisfying the soil moisture deficit caused by the heavy summer transpiration draft, deep percolation, and unknown factors. Average annual runoff has not changed significantly during the 15 years of the study. Slightly over 37 percent of the average annual precipitation is streamflow. Of this, two-thirds is ground water or base flow. The remaining one-third of the streamflow is surface[4] and subsurface runoff, which reaches the

TABLE 2.—AVERAGE LUMBER VOLUME, VALUE AND INCREMENT PER ACRE BY MAJOR TYPE AND MERCHANTABILITY CLASS ON WHITE HOLLOW WATERSHED[1]

Stand condition and type	1951	15-year increment	1951	15-year increment	Area, basis
	Board feet	*Board feet*	*Dollars*	*Dollars*	*Acres*
Non-merchantable	82				577
Merchantable					
Light sawtimber					
Pine stands	1,774	77	102	4.39	258
Hardwood stands	1,701	59	94	3.54	107
Heavy sawtimber					
Pine stands	8,350	199	512	10.08	563
Hardwood stands	8,172	188	480	11.51	210
All, merchantable	6,240	156	374	8.44	1,138

[1]Volume was scaled by International ¼ inch rule; values were based on February 1951 prices for rough green lumber delivered in Knoxville, Tennessee. Merchantable stand limits were 500 to 3000 bd. ft. per acre for light sawtimber.

TABLE 3.—INFILTRATION OF WATER INTO SOIL, AS AFFECTED BY LAND COVER AND USE

Cover condition	Seconds required for successive ½ inches to infiltrate			
	1st	2nd	3rd	4th
Cultivated preceding year	290	472	571	546
Pasture	65	89	110	121
Broomsedge, abandoned 5 years	33	67	77	92
Abandoned 5 years, burned severely after second year	159	287	340	382
Old field stands	39	52	62	73
Forest stands, second growth	36	46	53	62
Forest stands burned within 3 years	119	155	173	188

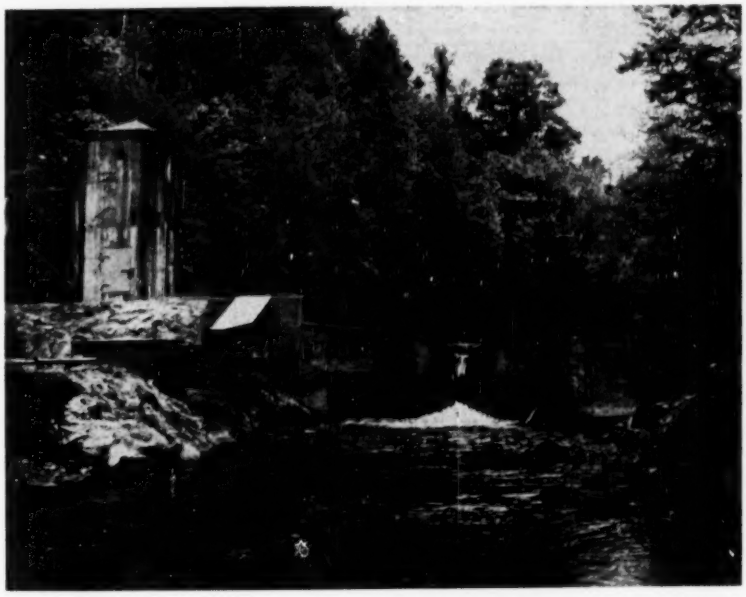


FIG. 5.—Present gaging station on White Creek. Below the weir and gage house is the automatic sediment sampler.

TABLE 4.—SEASONAL SURFACE RUNOFF FROM WHITE HOLLOW WATERSHED[1]

Season	Soil moisture condition	Surface runoff from storm precipitation of— 1 inch	2 inches	3 inches
		Percent		
Summer	Wet	7	20	
	Intermediate	2	4	8
	Dry	1	1	2
Winter	Wet	30	40	46
	Intermediate	13	23	29
	Dry	2	5	

[1]Based on representative storms and antecedent soil moisture conditions, 1935-1949.

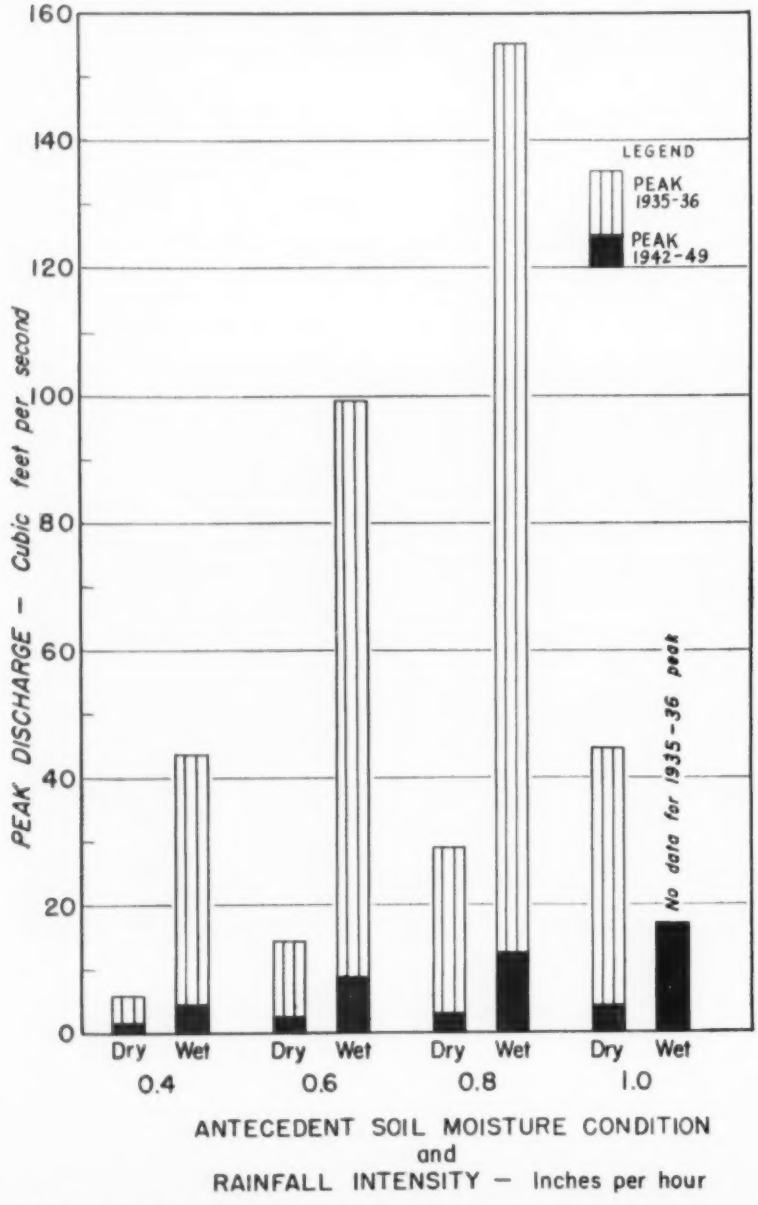


FIG. 6.—Reduction in peak discharge—summer season.

stream during and shortly after precipitation. The data in Table 1 indicate the normal contribution of precipitation to streamflow. They do not indicate the extreme variation found under various conditions of soil moisture, size of storm, and season of the year. Table 4 shows that much less surface runoff occurs during the summer season, and that antecedent soil moisture conditions may largely determine how much of a given storm will occur as surface runoff.

The decrease in peak runoff during the summer season is the most marked result of improved forest cover. Comparison of discharges in 1935-36 with those for storms of like intensity in 1942-49 indicate that peak discharge has been decreased by as much as 92 percent. As shown in Figure 6 the percent decrease is large, regardless of antecedent soil moisture conditions. This change represents the difference between flood conditions on White Creek and a more regulated flow—a flow which now rarely exceeds the bankfull stage during the summer season. The effect of cover change on peak discharge during the winter season is much less, ranging from 5.3 percent for large storms to 22.5 percent for small storms. Typical hydrographs (plots of discharge against time) for the summer and winter seasons and for early and more recent years are shown in Figure 7.

The influence of improved vegetation on runoff is also reflected in the frequency of peak flows of a given magnitude. Summer discharges have been so decreased that the highest flow in 1945 was equaled or exceeded 10 times in 1935. The peak discharge that was equaled or exceeded 5 times per season decreased from 49 cubic feet per second in 1935 to 13 in 1937, 9 in 1945, and 4 in 1949.

All data on maximum height of streamflow indicate that by far the greatest change occurred imme-

[1]Surface runoff, in this sense, is that part of storm runoff which leaves the watershed in a relatively short period by moving either over the land surface or through the upper soil layers.

diately after cultivation stopped and adequate protection from fire and grazing began. The rapid growth of vegetation in the early stages of succession effectively decreased the quantity of surface runoff. Reductions in surface runoff and peak flows have continued, and there is every indication that improvement will continue as the permanent forest cover develops. Corollary to the decrease in peak discharge is the extension of time required for storm waters to flow from the watershed (Figure 8). In 1943-47 it took over 5 times longer for 80 percent of summer storm waters to run off than it did in 1935-36. The flashy type of summer flood flow is virtually eliminated. Peaks are drastically reduced. The time it takes storm waters to flow off the watershed is greatly extended. All these changes are extremely beneficial to downstream inhabitants and users.

Records to date show no significant change in total water yield during the 15 years. This may sound strange in view of the expected drain on the water supply from increased transpiration by the much denser vegetal cover. The only inference is that the increased transpiration has been balanced by a decrease in evaporation and other losses. Neither has the annual runoff shown appreciable shift from the surface to ground water portions during the 15-year period (Table 1). The surface soils in this area have a high infiltration capacity, but commonly a heavy clay subsoil retards percolation downward. However, much of the runoff that had been overland flow now is delayed considerably in its travel to the stream. This helps to explain the marked decrease in summer peak flow without a noticeable change in seasonal distribution of runoff which might be expected if a large part of the surface flow had percolated downward to ground water.

An automatic sediment sampler was installed in the present weir in 1949. As soon as sufficient records have been collected for comparison with those taken manually

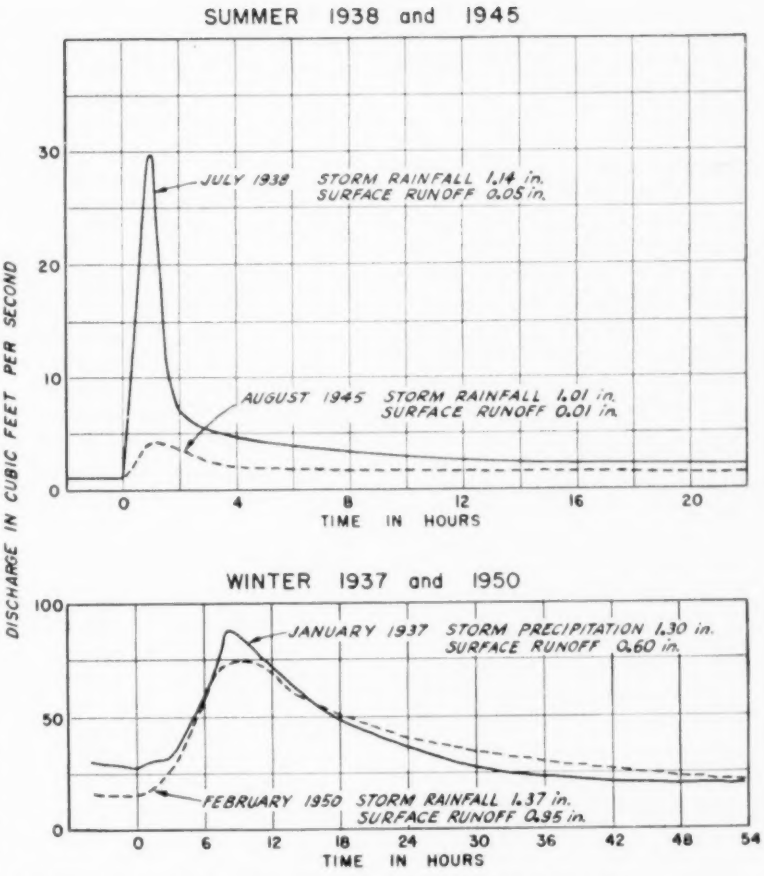

SUMMER 1938 and 1945
DISCHARGE IN CUBIC FEET PER SECOND
JULY 1938 STORM RAINFALL 1.14 in.
SURFACE RUNOFF 0.05 in.
AUGUST 1945 STORM RAINFALL 1.01 in.
SURFACE RUNOFF 0.01 in.
TIME IN HOURS
WINTER 1937 and 1950
JANUARY 1937 STORM PRECIPITATION 1.30 in.
SURFACE RUNOFF 0.60 in.
FEBRUARY 1950 STORM RAINFALL 1.37 in.
SURFACE RUNOFF 0.95 in.
TIME IN HOURS

FIG. 7.—Comparative story hydrographs on White Hollow Watershed.

in the early years, this phase of the study will be reported. Preliminary indications are that the silt load of this stream has decreased a great deal. In the early years of the study, silt flats in the upper end of the stilling pond above the weir indicated the quantity of silt carried by the stream. Now the silt flats are stabilized by vegetation and the stream runs clear even after high intensity rains. Trout fingerlings stocked in its waters are reported to be thriving.

Present Management Possibilities

White Hollow watershed is approaching optimum conditions for multiple-use management. During the past 15 years it has come a long way from subsistence farming toward a managed watershed capable of producing a steady supply of the products it is best suited to produce. Although there is no community downstream to use the water of White Creek, it might be well to consider its potential value. The minimum monthly flow of 0.3 inch could supply 150 gallons per day to over 3,000 persons. Since this water would require a minimum of treatment, it might well

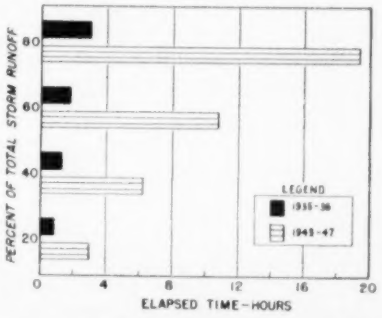


FIG. 8.—Distribution of time required for summer runoff.

have a gross value of $1.50 per month per family of 4. At this rate a potential annual value of $14,000 could be assigned to the water of White Creek. The Central Peninsula, of which this watershed is a part, has become an outstanding game management area in the State of Tennessee. The release of 13 deer near Norris Dam in 1935 has served to restock the Peninsula for hunting. The first controlled deer hunt took place in 1950. Another hunt in 1951 yielded 90 deer for 300 hunters. Squirrel and opossum hunts have likewise attracted many hunters.

The forests too are improving. The present volume of merchantable timber is over 7 million board feet (Table 2). During the past 15 years an average of 178,000 board feet has been added to the merchantable volume each year. Heavy stands of timber (over 3,000 board feet per acre) are present on only 35 percent of the area. In these stands, the average annual growth approaches 200 board feet per acre per year. By contrast, the 21 percent of the area in light sawtimber (under 3,000 board feet per acre) has grown at an average rate of only 72 board feet per acre per year—77 for pine and 59 for hardwood stands. The remaining 34 percent, most of which was formerly open land, is rapidly approaching the lower limit of merchantability for sawtimber. As stocking increases, good management should result in an average annual growth of well over 200 board feet per acre on the entire watershed.

Future timber harvests on this watershed will make possible the study of logging methods in relation to watershed values. The results of two small timber operations are being watched closely. When 300,000 board feet of beetle-killed pine was salvaged from 25 acres, the operator was required to do certain things to prevent erosion. He had to turn the water out of skid trails and drag brush into the major ones after he had finished with them. The second logging operation took place in 1951 on a small private tract within the watershed. Here a typical part-time sawmill operator cut 90,000 board feet from 30 acres in an uneven-aged stand. Although the full effect of this uncontrolled logging operation cannot be measured yet, it appears that erosion will be minor and limited to the sawmill site. The cut removed all sawlog-size trees, but left a heavy enough stand of young trees to provide adequate protection to the greater part of the cutover area. Runoff and sediment measurements will reflect the effect of this type of logging operation on watershed management.

Early in 1952 the Central Peninsula was transferred to the State of Tennessee. Research will continue on White Hollow Watershed and other forest experimental areas in cooperation with the Tennessee Department of Conservation. Results of this research will continue to furnish valuable information for use in the state and region.

Summary

The results of a 15-year study on White Hollow watershed evidence the benefits of practical watershed management through improvement of vegetal cover. In this headwaters drainage of 1,715 acres in Tennessee some thirty families had tried to eke out a living from soils primarily suited to timber production. The soils that will support crops or pasture are limited to small acreages on long, narrow ridges or diminutive flood plains. Forestry appeared to be the most practical and efficient land use and the watershed was managed for timber and water yield.

Reforestation and natural revegetation of formerly cultivated and abandoned fields have practically eliminated soil erosion. Growth and protection of the original forests during 15 years have improved stocking and provided excellent protection to the soils of the steeper slopes. The watershed is now yielding a sustained flow of potable water that would be adequate for the needs of approximately 3,000 people. It is a source of recreational values in the form of deer and squirrel hunts; it has possibilities for trout rearing. The average annual growth of timber for the past 15 years has been 156 board feet per acre on merchantable stands occupying one-half of the area. As more of the area reaches full stocking, growth should increase well over 200 board feet per acre per year for the entire watershed. The next step in this study is to determine the effect of maximum sustained production of timber and other products on the yield and quality of the water.

So far, the study illustrates that vegetal cover on small watersheds can be strengthened in a relatively short time, that erosion can be controlled, and that peak flows from summer storms can be greatly reduced. The improved vegetation has less effect on peak flows during the rainy winter and spring seasons. Total runoff over the year was neither reduced nor increased. But because of the better forest cover, water is used more efficiently on the land and streamflow is beneficially moderated.

FFF

Relation of Soil Properties to Site Index of Loblolly and Shortleaf Pines in the Piedmont Region of the Carolinas, Georgia, and Alabama

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Most of the pine forest lands in the South do not support stands whose age and stocking make it appropriate to use the direct method for the determination of site quality. The direct method of measuring site quality presupposes a known relationship between the total height and ages of dominant and codominant trees in well-stocked, even-aged stands.

It is conventional for Piedmont foresters who are interested in obtaining site index information, for management or acquisition purposes, to obtain the heights and ages of trees along a cruise line or on sample plots. These data are compared to height-age relationships as given in published site curves.[1]

Height-growth classification (site) curves for second growth stands have usually been made in connection with growth and yield studies of even-aged stands. The dominant and codominant trees in these stands are, by definition, in the upper crown canopy. The stocking of stands used in such studies is usually much greater than ordinarily encountered in the field; and, it is much higher than the stocking desired for the greatest volume yield in board feet.

Site curves for loblolly and shortleaf pines[1] give overestimates for well-stocked young stands. Trees remaining in cutover areas or partially-cut stands do not, in most cases, represent the dominant canopy of the original stands; hence, their height-age relationships do not represent the capacity of the site to produce.

The effect of certain soil features on height growth of trees in well-stocked even-aged stands makes it possible to estimate site quality of land for one or several species of pine regardless of stocking, age, past cutting, or species composition of the present cover.

Previous Work

Previous significant work on the growth of loblolly and shortleaf pine as related to soil properties was limited to the lower Piedmont region of North Carolina.[2] This work was based on 73 loblolly pine plots and 88 shortleaf pine plots, located in well-stocked, even-aged stands that had not been burned for at least 15 years. The range of age was from 30 to 80 for loblolly, and from 30 to 120 for shortleaf.

No significant relationship was found between site index and the topographic position of a stand apart from its soil characteristics.

The following soil variables were tested for their effects on height growth:

X_1 = Thickness (or depth) of the surface soil (A horizon)
X_2 = Ratio of silt plus clay to the moisture equivalent of the subsoil (B horizon)
$X_3 = (X_1X_2)$
$X_4 = (X_2)^2$
$X_5 = (X_1X_4)$
X_6 = Total depth of soil to substratum (C horizon)
$X_7 = (X_2X_6)$
$X_8 = (X_1X_6)$
X_9 = Imbibitional water value of the subsoil

Analysis disclosed that the site index of both species is determined by four of these soil variables, namely: X_1, depth of surface soil; X_2, ratio of silt plus clay to the moisture equivalent; X_4, $(X_2)^2$; and X_9, imbibitional water value of the subsoil. However, the effects of X_2 and its square, while statistically significant, do not contribute materially to the estimate of site index. And since the use of X_2 requires another laboratory measurement of the soil (silt plus clay), these two variables were dropped.

The final equations expressing site index of the two pines in the lower Piedmont region of North Carolina were the following:

For loblolly pine:

$$(S.I.)_L = 100.04 - \frac{75}{X_1} - 1.39\,X_9 \qquad (1)$$

For shortleaf pine:

$$(S.I.)_S = 77.32 - \frac{45}{X_1} - 1.00\,X_9 \qquad (2)$$

The standard error of a single estimate is approximately 9 feet for both equations.

Estimates of site index using these equations or tables derived from them have been made for hundreds of places in the Piedmont of the Carolinas. These estimates compare very favorably with the direct determination of site index of stands near index age (50 years) or older.

New Data

Additional data have been obtained on stands of both species and the soils that produced them in other parts of the Peidmont region of North Carolina, and in South Carolina, Georgia, and Alabama.

Because of the appreciable latitudinal range in the Piedmont and the possible effect of climate as well as past land use as reflected in erosion, especially on height growth, the data were classified as northern and southern Piedmont. Plots obtained north of the northern boundary of Stanley County, N. C. were designated as "North" and those south of this line were designated as "South."

Whereas all the old data[2] were from plots that had not been burned in recent years, the new data in-

[1] Misc. Pub. 50, U. S. Dept. of Agric. Volume, yield, and stand tables for second-growth Southern pines. Office of Forest Exp. Stations, U. S. Forest Service. 1929.

[2] Coile, T. S. Relation of soil characteristics to site index of loblolly and shortleaf pines in the lower Piedmont Region of North Carolina. Duke University, School of Forestry, Bulletin 13. 1948.

TABLE 1.—NUMBER OF SOIL SITE PLOTS BY SPECIES, GEOGRAPHIC LOCATION, AND FIRE HISTORY

Species	Data	"North"		"South"		Total
		Burned	Not burned	Burned	Not burned	
		(*B*)	(*NB*)	(*B*)	(*NB*)	
Loblolly	Old[1]		73[1]			73
pine	New	11	15	9	15	50
Shortleaf	Old[1]		88[1]			88
pine	New	4	48	25	34	111
Total		15	224	34	49	322

[1]Plots from which Equations 1 and 2 were developed.

cluded some stands that had been burned frequently. The number of plots for each species are classified in Table 1.

Analysis of Combined Soil-Site Data

The combined data furnished 123 plots in loblolly pine and 199 plots in shortleaf pine. Soil factors tested were the following:

$1/X_1$ where X_1 = Depth of A-horizon in inches
X_9 = Imbibitional water value of the B horizon
$1/X_9$ where X_9 = Imbibitional water value of the B horizon

Non-soil factors tested were burning (B) and geographic location (L).

Loblolly Pine

Analysis showed depth of surface soil (X_1) and imbibitional water value of the subsoil (X_9) both to be highly significant; but neither geographic location (L) nor the effects of burning (B) were of any significance. Tests of significance are presented in Table 2.

The final regression equation for estimating site index of even-aged loblolly pine in the Piedmont region is as follows:

$$\text{Log. } (\text{S.I.})_L = 2.0188 - \frac{0.399}{X_1} - 0.00843(X_9) - \frac{0.0198}{X_9} \qquad (3)$$

Although the last variable on the right is not significant, it has been retained because a large amount of soil-site data from the southeastern Coastal Plain indicates that if Piedmont and Coastal Plain data were combined, the net effects of imbibitional water values of the subsoil on site index would be curvilinear as indicated.

The standard error of estimate for loblolly pine is 11 percent of the calculated site index.

Figure 1 is the graphic presentation of the net relationship between site index and the two significant soil variables for loblolly pine. The plotted points connected with broken lines represent residuals or average deviation of observed site index from computed site index.

Shortleaf Pine

Depth of the surface soil (X_1) and physical properties of the subsoil expressed as imbibitional water value (X_9) are highly significant. Analysis of variance showing the contribution of soil and other factors to site index of shortleaf pine is given in Table 3.

The equation for estimating site index of shortleaf pine throughout the Piedmont region is:

$$\text{Log. } (\text{S.I.})_S = 1.8878 - \frac{0.1580}{X_1} - 0.00859(X_9) - \frac{0.0408}{X_9} + 0.0053(L) \qquad (4)$$

Where: L is +1 if in the "North"; and, L is −1 if in the "South."

The standard error of estimate is 12 percent of the calculated site index.

The net effects on site index of each of the two significant soil factors for shortleaf pine when one of the soil factors is held at its mean value is shown in Figure 2.

Imbibitional Water Value

Physical properties of Piedmont subsoils or B-horizon which condition water absorption, retention, movement, and availability are important factors affecting growth of tree roots. These properties also influence soil aeration or gas exchange between the atmosphere and the airspace within the soil.

The amount of fine material, silt and clay, in the soil is directly correlated with water-holding capacity and water availability. These amounts are recognized in various soil textural grades such as sands, sandy loams, loams, and clays. The amounts of various particle size classes are determined quantitatively by mechanical analyses. However, all soil particles of clay size, under 0.002 mm. diameter, do not have the same physical properties. The crystal structure of some clays is such that they absorb large amounts of water within their crystal lattice as well as upon their exterior surface. Such clays, on wetting and drying exhibit great changes in volume. The characteristic of marked swelling upon wetting results in poor internal soil drainage and hence poor aeration. In contrast clays whose lattice structure is fixed do not permit water molecules to enter the particle. They do not shrink and swell appreciably on drying and wetting. Soils containing clay of the latter type are well-drained and aerated when they are moist; whereas, soils containing large quantities of clay of the former type are poorly drained and aerated when moist or wet.

Because of the differences in adsorptive characteristics of molecules of water as compared to those of xylene, the difference between the moisture equivalent and the xylene equivalent of soils is correlated with the types as well as the amount of clay in soil. This difference, called imbibitional water value and designated as X_9 in this paper, is highly correlated in a linear manner with shrinkage and swelling of soil clays. The relation between this property of subsoils and site index is shown in Figures 1 and 2.

Fortunately, for field application

TABLE 2.—ANALYSIS OF VARIANCE OF SITE INDEX OF LOBLOLLY PINE AS AFFECTED BY SOIL PROPERTIES, GEOGRAPHIC LOCATION AND BURNING

Source	Degrees of freedom	Sum of squares		Mean square
Regression on $1/X_1$ alone	1	0.0640[1]		
Regression on X_9 ($1/X_1$ fixed	1	0.1567[1]	0.2218	0.07393[1]
Regression on $1/X_3$ ($1/X_1$ and X_9 fixed)	1	0.0011		
Effect of geographic location (L)	1	0.0036		
Effect of burning (B)	1	0.0004	0.0068	0.00227
Interaction (L × B)	1	0.0028		
Interaction of $1/X_1$ with L, B, and (L×B)	3		0.0019	0.00063
Residuals	113		0.2538	0.00225
Total, around general mean	122		0.4843	

[1]Significant at the 1 percent level.

TABLE 3.—ANALYSIS OF VARIANCE OF SITE INDEX OF SHORTLEAF PINE AS AFFECTED BY SOIL PROPERTIES, GEOGRAPHIC LOCATION, AND BURNING

Source	Degrees of freedom	Sum of squares	Mean square
Regression on $1/X_1$ alone	1	0.1183	0.1183[1]
Regression on X_9 ($1/X_1$ fixed)	1	0.2520	0.2520[1]
Regression on $1/X_3$ ($1/X_1$ and X_9 fixed)	1	0.0005	0.0005
Regression on L ($1/X_1$, X_9, and $1/X_3$ fixed)	1	0.0025	0.0025
Additional effects of burning (B) and interaction of burning and location (BL)	2	0.0075	0.0038
Residuals	192	0.5292	0.00276
Total, around general mean	198	0.9100	

[1]Significant at the one percent level.

of results the imbibitional water values of subsoils can be identified by broad classes on the basis of soil consistence when moist. For example, friable soils have relatively low imbibitional water values whereas very plastic soils have high values. In the former case this characteristic is independent of the amount of clay.

Soil samples of the same soil series in the Piedmont are relatively constant with respect to their X_9 values, and hence, if a field man can estimate soil consistence or identify the soil series, he can assign the proper average X_9 value to a soil.

Consequently, the subsoils of the Piedmont may be classified according to their X_9 values, as in Table 4. Analysis of variance of these data is presented in Table 5, which shows that the variation among classes is so great that the standard error of the difference between neighboring class means based upon the fewest samples—Classes 3 and 4—is 0.85, or less than one-fifth of the class difference.

The soil series and series variations which occur in the five subsoil classes are as follows:

Subsoil Class 1. *Very friable when moist.*
Durham, Altavista, Granville (very friable).

Subsoil Class 2. *Friable when moist*
Georgeville, Herndon, Alamance (friable), Tirzah, Efland, Goldston, Durham, Appling, Cecil, Madison, Lockhart, Worsham, Wilkes, Davidson, Mecklenburg, Lloyd, Tatum, Congaree, Chewacla, White Store (azonal), Mayodan, Penn, Granville, all colluvium.

Subsoil Class 3. *Semi-plastic when moist*
Alamance, Colfax, Enon, Creedmore, Wehadkee.

Subsoil Class 4. *Plastic when moist.*
Helena, White Store.

Subsoil Class 5. *Very plastic when wet*
Iredell, Orange, White Store (red phase).

A comparison of calculated site index for the two species, according to three classes of surface soil depth and subsoil physical properties, using old and new regression equations does not bring out very great differences (Tables 6 and 7). The addition of 50 new observations to the original 73 observations for loblolly pines does not materially change estimates of height growth (Table 6). New observations on shortleaf pines, 111 in number, ranged from North Carolina to Alabama. The regression equations developed by combining the new data with the original 88 plots, obtained in the lower Piedmont of North Carolina, give somewhat different estimates of site index (Table 7). The effect of depth of surface soil is greater in the case of the old equation (Eq. 2).

Field Application

The only equipment necessary for estimating site quality in the field is a soil auger. These can be purchased, or made locally. Steel auger bits of the type commonly used for wood having a diameter of 1½ inches are suitable. The pitch of the bit screw should be such that the distance between the flanges of the auger are the same as the diameter. If such a bit is used the small "leading" screw should be removed. The shank of the bit can be welded to a ¾-inch steel pipe and the latter welded to a pipe handle. The handle may be 1 inch in diameter and 12 to 14 inches long. The overall length of the soil auger should be 36 to 40 inches for work in the Piedmont. It should be marked at intervals of 6 inches to facilitate estimating soil depth to an inch.

In order to apply properly the results of this work the observer must have the same concepts of soil depth and of subsoil properties that were employed in the original work. These concepts are defined as follows:

Depth of surface soil.—Distance from the surface to a well-defined horizon of accumulation or subsoil. Fortunately, most residual Piedmont soils are highly differentiated with respect to texture. Practically always the B-horizon is one grade finer in texture than the surface soil; often the contrast in texture is even greater, the surface soil being a sandy loam and the subsoil a

TABLE 4.—INTERRELATIONS OF CONSISTENCE, TEXTURE, AND IMBIBITIONAL WATER VALUES OF PIEDMONT SUBSOILS

Subsoil class	Consistence when moist	Texture	Class range (X_s)	Number of soil samples n	Mean X_s	Standard error of mean
1	Very friable	Loamy sands & sandy loams	0-5	31	3.82	±0.54
2	Friable	Loams to clays	5-10	270	7.35	±0.18
3	Semi-plastic	Sandy clay loams to clays	10-15	20	12.00	±0.67
4	Plastic	Sandy clays to clays	15-20	33	17.00	±0.52
5	Very plastic	Clays	20-25	34	21.80	±0.51

TABLE 5.—ANALYSIS OF VARIANCE OF IMBIBITIONAL WATER VALUES OF PIEDMONT SUBSOILS

Source	Degree of freedom	Sum of squares	Mean square
Between subsoil classes	4	9,351.62	2,337.91
Between subsoil (series) within classes	30	268.53	8.95
Between tests, within soil series	353	1,522.37	4.32
Total, between tests	387	11,142.52	

sandy clay or clay. Moreover, the transition from surface to subsoil is usually abrupt or distinct. In cases where a transition zone of appreciable thickness exists—an A_3 or B_1 horizon or both—it should be considered as a part of the surface soil. For purposes of site estimation depths less than 1 inch do not occur; the minimum is usually 2 inches. Whereas the original surface soil may have been entirely removed by erosion or other means, and old subsoil may now be at the surface of the ground, the upper inch of two of this material is rapidly altered structurally as a result of wetting and drying and the incorporation of organic matters. This uppermost material is called surface soil even though it may have the same texture and consistence as the present subsoil.

From two to several measurements of the depth of surface soil should be made depending on local conditions. Where the depth of the surface soil has not been altered greatly over small areas by erosion, the variance of its depth is of about the same relative magnitude as the variance of the average height of dominant and codominant trees of the same age.

Properties of the subsoil.—The field characteristic most closely associated with the subsoil properties measured as imbibitional water value in this study is soil consistence. More specifically, it may be defined as the degree of friability of plasticity when moist. To classify soils properly with respect to this characteristic it is necessary to have some experience with soils throughout the range of moisture content that obtains in the field. A given subsoil may be wet in the winter, moist a part of the time, and relatively dry at other times. Unexposed subsoils do not become air-dry in the Piedmont. Their lowest moisture content is usually well above the permanent wilting percentage.

Both texture and structure are correlated with consistence. Texture can serve as an aid in the classification of consistence. For example, coarse textured soils are always friable regardless of moisture content; in contrast, clay soils may be friable or very plastic when moist, depending on the nature of the secondary clay minerals. The following description of consistence is applicable to the five subsoil classes recognized in this study.

Class 1. *Very friable.* Non-plastic when wet, cannot be molded into a "wire." Loose or non-coherent when dry. Typical of coarse-textured soils (sands, loamy sands, sandy loams).

Class 2. *Friable.* Only slightly plastic when wet. Crushed into aggregates under gentle pressure when moist. Soft when dry.

Class 3. *Semi-plastic.* Can be deformed and will ribbon out when worked while wet. When moist it will tend to crumble somewhat when ribboned out between the thumb and fingers. When relatively dry the soil is firm.

Class 4. *Plastic.* The soil is easily deformed and holds impressions when wet. When it is moist it can be molded continuously into various shapes without breaking. It is hard when dry.

Class 5. *Very plastic.* Soil has the properties of putty. When wet it can be

TABLE 6.—COMPARISON OF SITE INDEX ESTIMATES FOR LOBLOLLY PINE USING OLD AND NEW REGRESSION EQUATION (EQ. 1 AND 3)

		Depth of A horizon—Inches		
X_s	Equation	4	8	12
4	Old	76	85	88
	New	76	85	88
10	Old	67	77	80
	New	68	76	79
20	Old	53	63	66
	New	56	63	65

TABLE 7.—COMPARISON OF SITE INDEX ESTIMATES FOR SHORTLEAF PINE USING OLD AND NEW REGRESSION EQUATIONS (EQ. 2 AND 4)

		Depth of A horizon—Inches		
X_s	Equation	4	8	12
4	Old	62	68	70
	New—North	65	67	68
	New—South	63	66	67
10	Old	56	62	64
	New—North	58	61	62
	New—South	56	59	61
20	Old	46	52	54
	New—North	48	50	51
	New—South	47	49	50

TABLE 8.—SITE INDEX VALUES FOR LOBLOLLY AND SHORTLEAF PINES IN THE PIEDMONT PLATEAU AS INFLUENCED BY SOIL

Subsoil class	Subsoil consistence when moist	Species	Dept of subsoil—Inches						
			2	4	6	8	10	12	18
			Site index						
1	Very friable	Loblolly	57	79	82	86	88	89	91
		Shortleaf	51	62	66	68	69	70	71
2	Friable	Loblolly	52	74	77	81	83	84	86
		Shortleaf	47	59	62	64	65	66	67
3	Semi-plastic	Loblolly	46	68	71	75	76	77	79
		Shortleaf	43	54	58	60	61	62	63
4	Plastic	Loblolly	38	60	63	68	69	70	72
		Shortleaf	38	49	53	55	56	57	58
5	Very plastic	Loblolly	32	54	57	61	62	64	66
		Shortleaf	33	44	48	50	51	52	53

molded into various shapes and will form a long ribbon when worked. It is firm but can be molded under moderate pressure at intermediate moisture contents. When dry it is extremely hard.

It should be noted that only clays or sandy clays can be classified as plastic or very plastic, although some clays are friable.

Estimation of site quality in the field can be facilitated by the use of Table 8 which was derived from Equations 1 and 2. Field tests may make it desirable to develop tables from Equations 3 and 4 for the southern part of the Piedmont.

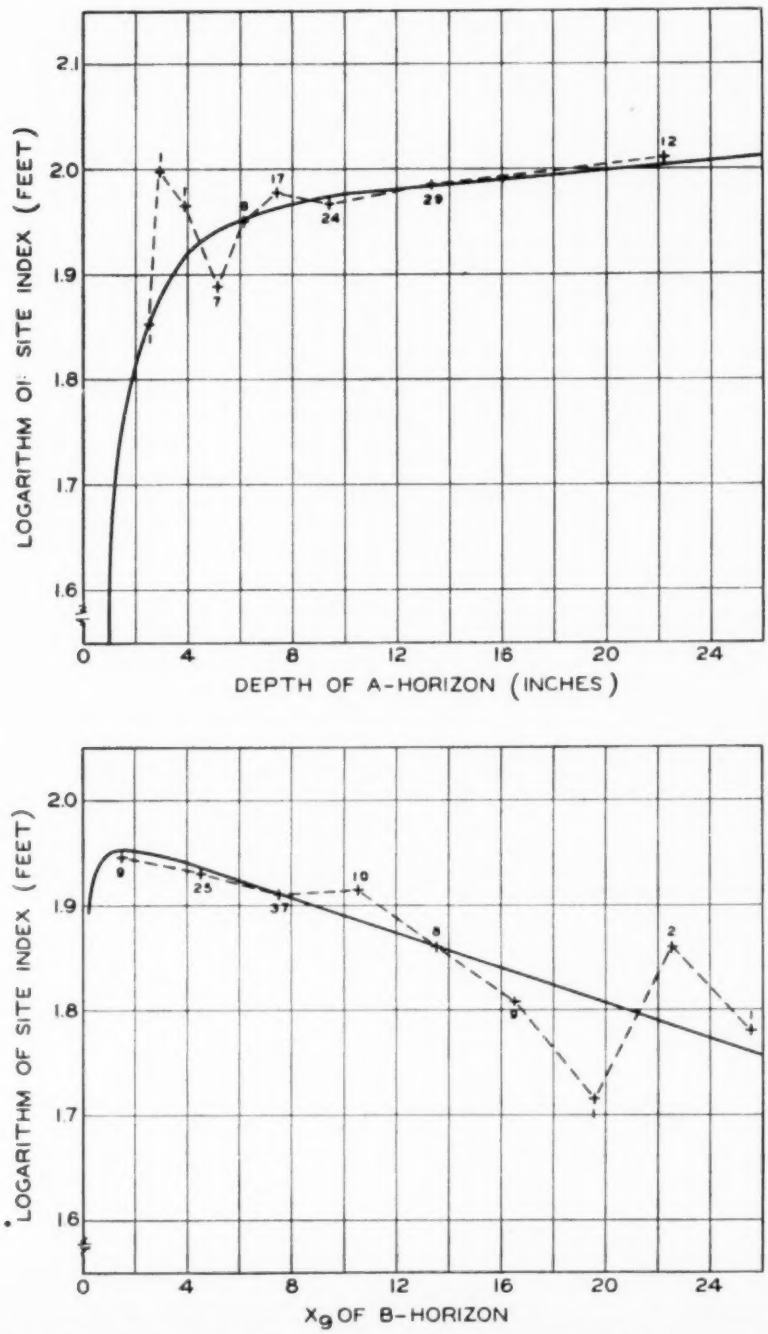

FIG. 1.—Relation between site index for loblolly pine expressed logarithmically, and the depth of the surface soil and the imbibitional water value of the subsoil. Broken lines connect the mean residuals from regression; the number of plots upon which each point is based is indicated by the adjacent number.

Field Tests

Numerous field tests of the soil-site data given in Table 8 have been made in North Carolina and in parts of South Carolina. This table is based on Equations 1 and 2. The field tests compared "tree-site" index with "soil-site" index. The former was obtained in the regular manner by measuring the total height and age of six to eight dominant trees in a well-stocked even-aged stand over 30 years old, and extrapolating site index from appropriate curves in U. S. Dept. Agric. Misc. Pub. 50. A similar number of observations of surface soil depth and subsoil class (consistence) were made and their mean values used to assign "soil-site" index from Table 8. When several stands and soils are thus examined there is no significant difference between the average of the estimates obtained by the two methods.

The principal use for the indirect or soil method was originally visualized for land not supporting stands of suitable age, stocking, or species for direct site determination. Examples of this are cutover, abandoned fields, very young stands, uneven-aged or partially stocked stands, or even land which presently supports other tree species. However, field tests with the soil method of estimating site potential show that it is just as precise as the direct method and requires only about one-third of the time needed to measure total height and ages accurately and then obtain site index from curves or tables; hence, it is recommended for use even when stands suitable for tree measurements exist.

Many who use the direct method of site determination do not fully recognize the sources and magnitude of errors or inaccuracies involved therein. Common inaccuracies in measurement of total heights of trees with an Abney level are due to: (1) base line not properly measured or not as long or

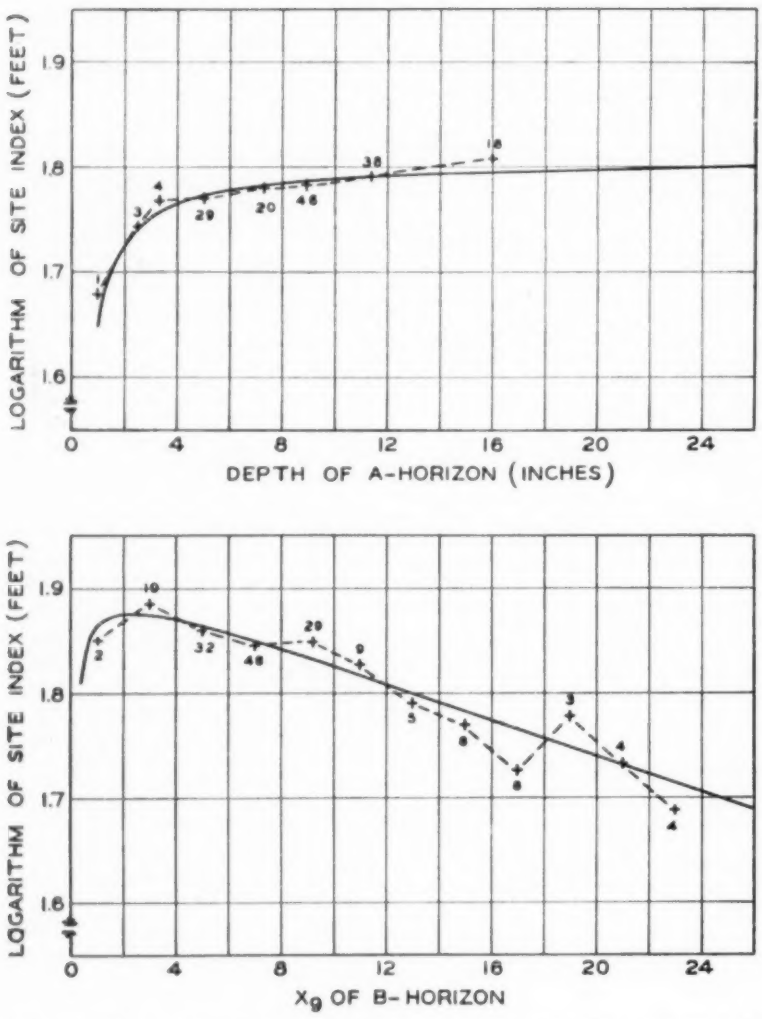

FIG. 2.—Relation between site index of shortleaf pine, expressed logarithmically, and two important soil variables. Broken lines connect the mean residuals from the regression; the number of plots upon which each point is based is indicated by the adjacent number.

longer than the height of the tree; (2) Abney is not in adjustment; (3) tip of tree and its base are difficult to see because of understory or density of the stand; (4) total age of a tree cannot be obtained accurately because: (a) tree center is not encountered, or (b) ring counts may be confused by "false" rings when a core is taken with an increment borer, or (c) when age is taken at 4.5 feet the time required for the tree to reach that height may be mis-estimated.

Conventional site index curves contain error of unknown magnitude because of certain basic assumptions with respect to the form of the curves and the relation of the distance between curves to age. This error is known to exist but it is not measurable from site index data alone.

Tests of the relation between site index as estimated from the soil and tree site index for stands 10 to 30 years of age have indicated that site curves for loblolly and shortleaf pine give over-estimates for young stands.

It is suggested that those who wish to use the soil-site method for estimating land quality would benefit by testing both methods (tree vs. soil measurements) in several existing stands whose soils are widely different. It should give the observer confidence when the soil method is applied to areas where suitable trees for direct site estimation do not exist.

A Natural Hybrid Spruce in Alaska

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WHERE the northern and western coniferous forests meet in northwestern North America, hybridization and intergrading between related tree species may be expected. For example, Moss (*9*) observed natural hybrids between jack pine (*Pinus banksiana* Lamb.) and lodgepole pine (*P. contorta* Dougl.) in central and northwestern Alberta, where ranges of these species overlap. This cross had also been produced artificially and was named *Pinus* × *murraybanksiana* Righter & Stockwell (*11*). Intergrades between white spruce (*Picea glauca* [Moench] Voss) and Engelmann spruce (*P. engelmannii* Parry) apparently are common in southern British Columbia. The natural hybrid between white spruce (*Picea glauca* [Moench] Voss); formerly known as *P. canadensis*) and Sitka spruce (*P. sitchensis* [Bong.] Carr.) is here recorded from Kenai Peninsula of southern (or south central) Alaska.

Published compilations have mentioned the natural or artificial hybrid between *Picea glauca* (*P. canadensis*) and *P. sitchensis*. Among these are lists by Schreiner (*12*, p. 1248), by Johnson (*5*, p. 420-421), who recorded this cross from northern Europe, especially Denmark, as showing pronounced hybrid vigor, and by Richens (*10*, p. 20). However, records of the natural hybrid apparently were from plantations rather than forests of wild trees.

In 1926, Fabricius (*3*, p. 498, fig. 15-16) recorded and illustrated this hybrid from Husby Plantation in Denmark. Larsen (*6*, p. 96) again referred to this cross at Husby Plantation and at Hollund Sögaard in Jutland and illustrated artificial hybrids between *Picea engelmannii* and these two species. He (*7*, p. 185-187, fig. 35-36) described an experimental cross between *Picea glauca* and *P. sitchensis* and self-pollination (F_2) and back cross of the hybrid with *P. glauca*. At the age of three years, the first-generation hybrids were the largest of the three groups. Later, Larsen (*8*) suggested that it may be advantageous to grow hybrids between species already in cultivation, such as the cross between *Picea glauca* and *P. sitchensis*. Eklundh (*2*) noted that *Picea glauca* crossed readily with *P. sitchensis* and *P. engelmannii*, though the latter belonged to a different section of the genus. Sylvén (*13*) reported that the artificial cross between *Picea glauca* and *P. sitchensis* produced in 1942 was proving a very fast grower at Ekebo, Sweden.

Thaarup (*15*) reported that where *Picea glauca* and *P. sitchensis* were grown near each other in Denmark, crossing was so common that it was impossible to harvest pure seed of the latter. At two plantations the hybrids had poor form with crooked or inclined stems. A warning was issued against using the hybrid and against collecting seed of *P. sitchensis* in localities where crossing might occur.

Van Campo-Duplan and Gaussen (*16*) regarded three named conifers of western North America as intergeneric hybrids between *Picea* and *Tsuga*. One of these supposed hybrids was designated as *Tsuga-Picea hookeriana* (A. Murr.) Van Campo & Gauss. *Tsuga heterophylla* (Raf.) Sarg. × *Picea sitchensis* (Bong.) Carr.).

Prof. Harold John Lutz, of Yale University School of Forestry, collected specimens of the hybrid between *Picea glauca* and *P. sitchensis* on Kenai Peninsula within Chugach National Forest in the summers of 1950 and 1951 while employed in research work by the United States Forest Service. He recognized the hybrid in the field and forwarded specimens and notes to the Forest Service Herbarium. On June 29, 1950, he collected specimens (*Lutz 628*) on the west side of the outlet of Jerome Lake. Groups of intermediate individuals as well as trees of both the supposed parents were observed at that locality. The intermediate trees did not exhibit noticeable hybrid vigor nor did they show any other differences in general appearance. Part of this material was sent to J. P. Anderson, author of a flora of Alaska, who agreed that it was a hybrid.

On June 19, 1951, Lutz collected a series of specimens from four trees 8 to 13 inches d.b.h. and 35 to 55 feet tall, along the shore of Kenai Lake near the ranger station there. One (*Lutz 1004*) is identified as *Picea sitchensis*, another (*Lutz 1003*) differing but slightly is referred to that species with doubt, and two (*Lutz 1002, 1005*) seem sufficiently intermediate to be called hybrids. Another specimen (*Lutz 1001*), collected June 7, 1951, near mouth of Crescent Creek, not far from Kenai Lake, is doubtfully named as *Picea glauca*. Intermediate trees were observed in abundance also on the south side of the outlet of Kenai Lake.

No reference to this natural hybrid has been found in floras and tree publications of Alaska. Examination of the large Alaska collections in the National Herbarium of the U. S. National Museum revealed no specimens of this hybrid. During a search for further records, two other foresters, B. Frank Heintzleman, of the U. S. Forest Service, and Dow V. Baxter, of the University of Michigan, mentioned having seen the intermediate spruces on Kenai Peninsula. Baxter (*1*, pp. 102-107, figs. 4-5, pls. 6-8) also made a study of forest and fungus succession on Kenai Peninsula near Russian River, only about 10 miles west of Kenai Lake, mentioned above. This locality was selected because it illustrated intermingling and mixing of interior

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continental forests of *Picea glauca* and rainy coastal forests of *Picea sitchensis*.

Apparently this hybrid spruce has not been designated as a binomial. Formal publication of a name honoring the collector follows:

Picea × lutzii Little, new hybrid.[1] *Picea glauca* × *sitchensis*. Lutz spruce. Hybrid tree 55 feet (17 meters) high and 1 foot (0.3 m.) in trunk diameter, with leaves and cones intermediate between *Picea glauca* (Moench) Voss and *Picea sitchensis* (Bong.) Carr. Twigs yellowish, glabrous. Leaves spirally arranged, linear, 10-16 mm. long, about 1.5 mm. broad, and more than 1 mm. thick, acute, slightly 4-angled or slightly keeled on both sides, upper surface with 5 to 8 rows of stomata on each side and lower surface with 2 to 4 rows of stomata on each side. Opened cones oblong-cylindrical, 3-6 cm. long and 2.5-3 cm. broad; scales rounded, about 12-14 mm. long and 10-11 mm. broad, thin, yellow brown denticulate on margin; bracts ovate, 4-5 mm. long and 2-3 mm. broad, obtuse, denticulate.

The hybrids have leaves intermediate between the 4-angled and flattened needles of the parent species, being unequally 4-angled, less prominently so than in *P. glauca*, with the angle or keel on upper surface the smaller. The leaves approach *P. sitchensis* in the more numerous rows of stomata on the upper surface and in the sharp points. The cones are about the size of those of *P. glauca* or intermediate in size. Cone scales are rounded as in *P. glauca* but thin with denticulate margins and lighter colored as in *P. sitchensis*. The ovate, obtuse cone bracts are intermediate between the elliptical, rounded, shorter bracts of *P. glauca* and the narowly acute, longer bracts of *P. sitchensis*.

The following specimens of *Picea* × *lutzii* may be cited, all collected by Harold J. Lutz on the Kenai Peninsula within Chugach National Forest, Alaska, and deposited in the Forest Service Herbaria at Washington, D. C. and at Alaska Research Center, Juneau, Alaska. *Lutz 1005* (FS 102464), near shore of Kenai Lake near ranger station, June 19, 1951, TYPE collection (HOLOTYPE deposited in the U. S. National Museum); *Lutz 1002* (FS 102461), same data; *Lutz 628* (FS) 101524), west side of outlet of Jerome Lake, June 29, 1950. The type collection has male strobili as well as mature, opened cones.

The typical variety of *Picea glauca* is represented in this cross. However, *P. glauca* var. *porsildii* Raup, Porsild spruce, a minor variety distinguished by smooth bark with resin blisters and by relatively broad crown, has been collected by Lutz on Kenai Peninsula and at other localities in Alaska.

The parent species are not closely related but belong to different sections of the genus *Picea*. In Section *Eupicea* Willk., to which *P. glauca* belongs, the leaves are 4-angled bearing stomata on all 4 sides, and the cone scales are firm, usually entire, and rounded at apex. In Section *Casicta* Mayr, which includes *P. sitchensis*, the leaves are 4-angled with stomata on all 4 sides or compressed and with fewer stomatal lines beneath, and cone scales are thin and flexible, usually rhombic, with denticulate wavy margin and obtuse apex.

Lutz has observed that the ranges of these two species of *Picea* overlap in a belt along the western edge of Kenai Mountains and in the valley of Goat Creek on the west flank of Chugach Mountains between Anchorage and Palmer. He states that the two species are reported to intermingle in the northwestern section of Prince William Sound and probably do so in the lower Copper River Valley. Distribution maps of the forest regions of Alaska by Taylor and Little (*11*) and of the forest regions and individual species by Hultén (*4*, maps 57a, 57b, 59, 60b) show the hemlock-spruce (*Tsuga heterophylla—Picea sitchensis*) coastal forest and spruce-birch (*Picea glauca—Betula*) interior forest meeting in the areas of Kenai Peninsula and Cook Inlet.

[1] **Picea × lutzii** Little, hybrida nova, Lutz spruce. *Picea glauca* (Moench) Voss (Deut. Dendrol. Gesell. Mitt. 16:93. 1907) × *Picea sitchensis* (Bong.) Carr. (Traité Gén. Conif. 260. 1855). Arbor hybrida 17 m. alta, trunco 0.3 m. diametro, foliis atque strobilis inter *Picea glauca* (Moench) Voss et *Picea sitchensis*, (Bong.) Carr. intermediis. Ramuli flavescentes, glabri. Folia linearia, 10-16 mm. longa, circa 1.5 mm. lata, et plus quam 1 mm. crassa, acuta, leviter 4-angularia vel utrinque leviter carinata, supra utrinque 5-8 seriebus stomatum, subtus utrinque 2-4 seriebus stomatum ornata. Strobili aperti oblongo-cylindrici, 3-6 m. longi et 2.5-3 cm. lati; squamae rotundatae, circa 12-14 mm. longae et 10-11 mm. latae, tenues, flavido-brunnea, margine denticulatae; bracteae ovatae, 4-5 mm. longae et 2-3 mm. latae, obtusae, denticulatae.

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Coming Events

C.I.F. Annual Meeting

The Canadian Institute of Forestry will hold its annual meeting, with the theme of "The Forest Situation in Canada," October 19-21, in Winnipeg, Manitoba.

American Forest Congress

The American Forest Congress of the American Forestry Association will meet in Washington, D. C., October 29, 30 and 31.

Central States Section S.A.F. Meeting

The annual meeting of the Central States Section will be held at Oregon, Illinois, 90 miles west of Chicago on October 12, 13, and 14. A day and a half tour of Sinnissippi Forest, a private ownership of 2,700 acres under intensive management, preceded by an evening meeting on October 12 is planned.

The program chairman is Dr. J. Nelson Spaeth, University of Illinois, Urbana.

Kentucky-Tennessee Section Winter Meeting

The winter meeting of the Kentucky-Tennessee Section will be held in Gatlinburg, Tenn., Nov. 13 and 14. Paul Lane is chairman of the arrangements committee.

Mid-Century Conference Resources for the Future

Resources for the Future, Inc., will hold its "Mid-Century Conference" in Washington, D. C., December 2-4.

Western Forestry and Conservation Association

The Western Forestry and Conservation Association will hold its 44th forestry conference and annual meeting, Seattle, Washington, December 8-12.

Wisconsin Silver Anniversary Forestry Conference

The Wisconsin State Chamber of Commerce, Wisconsin Conservation Commission, U. S. Forest Service, and Forest Products Laboratory will sponsor a conference Nov. 30 and Dec. 1 in Milwaukee, to plan the state's forestry program for the coming 25 years.

Notes

Farm Woodland Picture Looks Better

Reports of the U. S. Census of Agriculture indicate that in the Upper Mississippi Valley, at least, the acreage of woodland on farms is holding its own. And equally important, farmers are slowly but surely beginning to realize that good livestock deserves better feed than can be found in the woods.

The subject of well managed woods and improved pasture is particularly significant as it applies to this "heartland of American agriculture." This region embraces only about 11 percent of the United States farm acreage, but better than one-third of the total farm land value is concentrated in eight states. This fact reveals the intensity of land use. Two out of every five dairy cows in the country are pastured in the Upper Mississippi Valley states.

The following tabulation shows what has happened to total woodland areas on farms and to the acreage of non-pastured woods, in the fifteen years prior to 1950. Even the slight reduction in total woodland on farms may be more apparent than actual, because in 1949 census enumerators were instructed to exclude any large tracts of timber not pastured when it was evident that such land was not being used as a part of the farm. Those instructions were not given in 1934.

Several important developments appear to be responsible for this favorable trend:

1. *Better use of farm land.* To be sure, there still is a sizable acreage being cleared for crops and pasture and this trend will continue to some degree. But, with an improved knowledge of soils, farmers are carefully studying land capabilities before they embark on expensive clearing. The era of indiscriminate clearing is coming to a close.

2. *Increased tree planting.* Every year, more nursery stock is available for farm planting, and the use of planting machines is developing so rapidly that state nurseries have had difficulty in meeting the demand for trees to feed machines. Before long, if not now, in many localities farmers will plant as many acres as they clear, or even more.

3. *Improved livestock.* More farmers are improving their herds. With better stock comes better feeding. The owner of a pure-bred herd is reluctant to risk the well-being of his thousand-dollar cows for a few cents' worth of low-grade woodland forage.

4. *Better pasture and grassland programs.* Agricultural agencies and leaders have stepped up the emphasis on improved forage crops. Better strains of grasses and legumes are available; renovation and the use of fertilizers on pastures are becoming common practices. The progressive farmer is no longer satisfied with the digestible nutrients that come off the so-called "permanent" pasture. And he certainly does not place much value on the brush, wild grasses and weeds that grow in his woods.

5. *Woodland appreciation.* Foresters rightly can take some credit for this trend. Increasing numbers of such specialists are available each year to give direct help to farmers. Certainly the educational effort of the extension foresters over the years is bearing fruit. What yesterday's youngsters learned in 4-H projects, and in conservation education in schools, is now being put into practice.

For a momentary lift, then, the 1950 Census of Agriculture gives some encouragement in one phase of the total farm woodland job. But no one who knows the big problems ahead will be smug about it. Generally speaking, woodland owned by farmers is still in bad shape; comparatively, it is probably the worst managed land of any. We know what discouragingly slow progress has been made to get farmers to crop (weed and harvest) their woodland in a manner approaching what they do on other parts of the farm.

In contemplating the big job ahead, is there a lesson to be learned from past accomplish-

TABLE 1.—WOODLAND ON FARMS IN UPPER MISSISSIPPI VALLEY STATES

State	Year	Total area		Area not pastured	
		M acres	Percent reduction	M acres	Percent increase
Illinois	1935	3,123	2	864	
	1950	3,050		1,009	17
Indiana	1935	3,064	6	972	
	1950	2,878		1,218	25
Iowa	1935	2,312		252	
	1950	2,320		418	66
Michigan	1935	3,816	2	933	
	1950	3,721		1,576	69
Minnesota	1935	5,383	5	1,214	
	1950	5,092		1,743	43
Missouri	1935	8,903	5	2,518	
	1950	8,498		2,694	7
Ohio	1935	3,159	3	1,109	
	1950	3,047		1,441	30
Wisconsin	1935	6,512	1	1,264	
	1950	6,426		2,002	58
Region	1935	36,272	3 percent	9,126	
	1950	35,032		12,401	32 percent

ments? Are foresters finally coming to recognize that they cannot do the job alone? We can lead; we can teach; we can demonstrate; we can be evangelists. But if we are to succeed, we need many disciples to help carry the torch. These disciples will not be identified by any one agency, public or private, nor in any single professional group.

We were not successful in checking land clearing by ourselves, nor can we take exclusive credit for getting livestock out of the woods and onto good pastures. In the same way, we need help to carry on. We cannot be exclusive, either agency or profession-wise.

STANLEY S. LOCKE
Soil Conservation Service
Milwaukee, Wis.

Site-Index Estimates Made Easy

Foresters often have to quickly estimate how well a certain tree species will grow on a given piece of land. Several things influence the land's ability to produce trees of course, and the combination of these things determines what is called "site quality."

To make it easier to estimate site quality of land for white oak (*Quercus alba* L.) in the hills of southeastern Ohio, a site-index meter was developed.[1] This meter combines the three important variables found to influence site quality for this species: (1) How far up the slope the particular piece of land is, (2) exposure of the slope, and (3) depth of the soil.[2] White oak grows best on lower, northeastern slopes and in deep soil; it grows poorest on high, southwest slopes and ridge-tops where the soil is thin. White oak saw timber on the best sites may yield 2½ times as much as on the poorest sites.

To use the site-index meter the fieldman must classify a piece of land into 1 of 4 slope positions, 1 of 8 aspects, and 1 of 4 soil depths. The business

[1] The meter was designed by the late R. N. Gaiser. The author has modified the original design slightly.

[2] R. N. Gaiser. Relation between topography, soil characteristics and the site index of white oak in southeastern Ohio. Central States Forest Experiment Station. Technical Paper No. 121, 12 pp., illus. 1951.

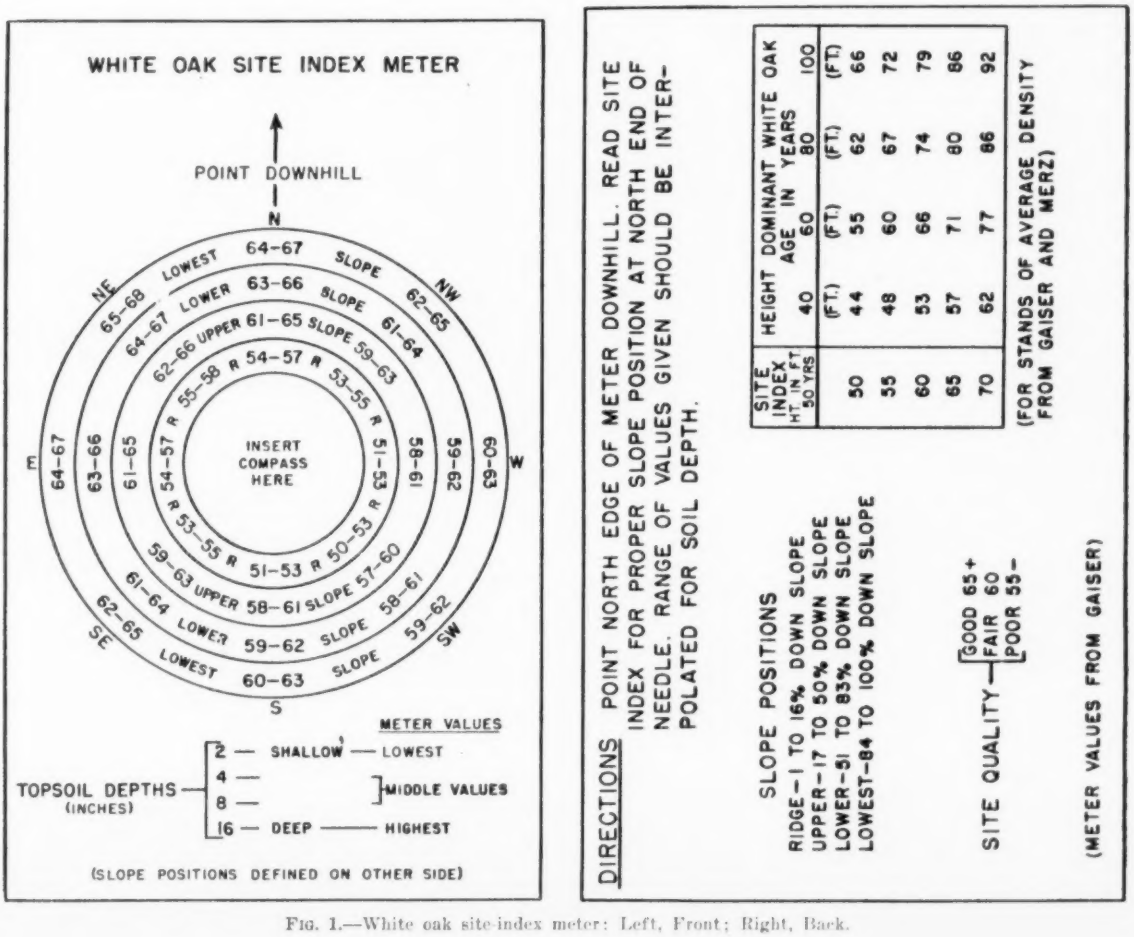
WHITE OAK SITE INDEX METER
POINT DOWNHILL
N
NE
NW
E
W
SE
SW
S
LOWEST SLOPE 64-67
LOWER SLOPE 63-66
UPPER SLOPE 61-65
R 54-57 R 53-55 R 51-53 R 50-53
INSERT COMPASS HERE
64-67
63-66
61-65
54-57 R 55-58
65-68
64-67
62-66
62-65 61-64 59-63 58-61
59-62 58-61 57-60
59-63 58-61
61-64 59-62
62-65 60-63
METER VALUES
TOPSOIL DEPTHS (INCHES)
2 — SHALLOW — LOWEST
4 —
8 — MIDDLE VALUES
16 — DEEP — HIGHEST
(SLOPE POSITIONS DEFINED ON OTHER SIDE)
DIRECTIONS POINT NORTH EDGE OF METER DOWNHILL. READ SITE INDEX FOR PROPER SLOPE POSITION AT NORTH END OF NEEDLE. RANGE OF VALUES GIVEN SHOULD BE INTERPOLATED FOR SOIL DEPTH.
SLOPE POSITIONS
RIDGE—1 TO 16% DOWN SLOPE
UPPER—17 TO 50% DOWN SLOPE
LOWER—51 TO 83% DOWN SLOPE
LOWEST—84 TO 100% DOWN SLOPE
SITE QUALITY — GOOD 65+ FAIR 60 POOR 55-
SITE INDEX HT. IN FT. 50 YRS
HEIGHT DOMINANT WHITE OAK AGE IN YEARS 40 60 80 100
50 (FT.) 44 55 62 (FT.) 66
55 48 60 67 72
60 53 66 74 79
65 57 71 80 86
70 62 77 86 92
(FOR STANDS OF AVERAGE DENSITY FROM GAISER AND MERZ)
(METER VALUES FROM GAISER)

FIG. 1.—White oak site-index meter: Left, Front; Right, Back.

side of the instrument consists of a series of 4 concentric circles, each representing a certain proportion of the distance down a slope from the ridge. This series of circles is divided into 8 sectors corresponding to the points of the compass (Fig. 1-Left). A range of site-index values is given for each circle (or slope position) and sector (or aspect). The exact index for a given aspect and slope position is interpolated from this range of values according to the depth of the soil. Thus, a northeast, lower slope can have a site index ranging from 64 if the soil is shallow (2 inches) to 67 if the soil is deep (16 inches).

For the most convenient use, the meter figures and outline should be imprinted on a small block of wood. Cut out the center circle to about half the thickness of the block and recess a small compass into it. The directions and key for using the meter (Fig. 1-Right) can be imprinted on the back or underside of the block. Several coats of varnish or lacquer will make the tool weather resistant.

To use the meter, hold it level, point the top edge down the slope and read from the appropriate circle the site index for the sector that the north end of the compass needle is pointing to. Interpolate the reading according to the average depth of the soil and the job is done.

The meter has several uses. In forest surveys where plots are measured, it can be used to estimate the ability of land to grow white oak. The author recently used the meter in a survey of an experimental forest to determine the range of site quality for white oak. It can also be used to estimate the quality of planting sites for white oak.

The meter is based on white oak data. It is believed, however, that good white oak sites are also good sites for the other species commonly associated with white oak. So the meter may have some value for measuring relative differences in site quality for other hardwood species. However, it should be used in this way only with great caution.

This meter should be used only in the unglaciated part of the central hardwoods region where forest conditions are similar to those found in southeastern Ohio. However, such an instrument as this could be developed for any other species and region where site quality is determined by factors similar to those mentioned here.

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Buckeye Research Center,
Central States Forest Exp. Sta.

Use of Bow and Arrow in Collecting Small Limb Samples

The following technique was used successfully in collecting small limb samples from tall trees for oak wilt confirmation.

A 45 pound bow, long heavy metal arrow and special "spinning" reel attachment are used to get a light nylon line over a high limb crotch. ¼ or ⅜ inch manila line is then pulled up and back to the ground by the nylon line. One end of the manila line is then attached just below the head of a short handled pole pruner and the other end to the lower portion of the handle. A second line is attached to the regular pull rope. The pruners are then hauled up and hooked over the branch to be cut. By holding tension on the line which is tied to the lower portion of the handle and pulling on the rope, the sample is cut from the tree.

As three lines have to be maneuvered at once, this method is most successful when there are two operators on the ground.

A one man method is to shoot the line over a small branch from which the sample is to be taken; a parachute cord line is then hauled over the branch and back to the ground. A slip knot is tied on the cord and a retrieving line attached to the knot. The slip knot is then pulled tight and the limb broken off. If too strong a limb is tackled the retrieving line can be used to loosen the slip knot.

These methods are much safer to use than the process of climbing the tree and the equipment is fairly light to carry.

With practice several samples can be taken from one tree in a half hour or less.

R. L. OLMSTEAD,
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Department of Conservation,
Jackson, Michigan.

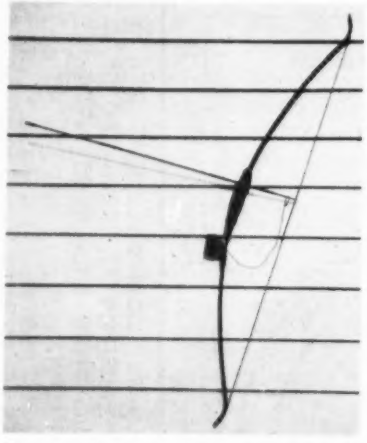

FIG. 1.—Bow, "spinning" reel, light nylon line, and attached arrow.

FIG. 3.—The arrow carries its attached light cord over a supporting limb and is then used to raise a heavier line that in turn lifts the pruning tool.

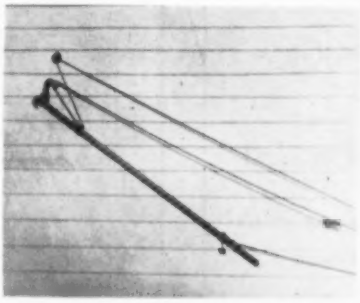

FIG. 2.—Pruner, with lifting line attached to upper and lower ends of handle and pull rope extended.

FIG. 4.—The pruner raised to position for cutting limb samples from the upper portion of trees.

Points of View

Further Comments on Commercial Forest Tree Species

In his article in the April, 1953, issue of the JOURNAL,[1] I believe Mr. Dayton has omitted from his list a number of important species. Of course, it is not to be expected that everyone will agree completely with any list but should not Mr. Dayton have considered the following named species worthy of listing?

Picea sitchensis
Quercus borealis
Chamaecyparis lawsoniana
Prunus serotina
Quercus falcata
Nyssa sylvatica
Nyssa aquatica

Furthermore, it disturbs me that species of perhaps only secondary importance, such as the following, were not included.

Acer macrophyllum
Fraxinus oregona
Cornus florida
Diospyros virginiana
Magnolia grandiflora
Magnolia virginiana
Quercus macrocarpa

Mr. Dayton included such important tree species as *Castanea pumila*, several scrub oaks, scrub pines, and junipers, but ignored species that seem to me to be no less important, and which are occasionally used for pulp, specialty wood, ornamentals, etc. Do not some of the following named species deserve a place in a list of commercial trees? (Most of these have been recognized as commercial species in the *American Woods* pamphlets and other publications by the U. S. Department of Agriculture.)

Betula populifolia
Carya carolinae-septentrionalis
Carya ovalis
Cladrastis lutea
Cornus nuttalli
Fraxinus tomentosa (*F. profunda*)
Guajacum sanctum[2]
Gymnocladus dioicus
Juniperus pachyphloea[3]
Maclura pomifera
Nyssa biflora
Ostrya virginiana
Pinus leiophylla
Pinus pungens
Pinus radiata
Quercus gambeli
Quercus imbricaria
Sassafras albidum
Taxodium ascendens
Tsuga caroliniana
Ulmus serotina

Although Mr. Dayton's list is limited to species, it is a little misleading to list *Pinus contorta* without making some mention of *P. contorta* var. *latifolia*.

I wonder if *Quercus agricola* is the same as *Quercus agrifolia*, if some tree has been given the name *Pinus engelmanni*, and whether *Quercus michauxii* is not a synonym for *Q. prinus*. Of course, in the present stage of vacillation of the allegedly stable Latin names, these could easily be the current fad in names for some of the species I have mentioned above. I have hopes that some time the Latin names will become monotonously permanent and that it will not be necessary to remember two or three aliases for each species. Could not a species be granted a sort of "squatter's right" to a Latin name that has been in use for years? Eventually, this process would lead to a relatively permanent nomenclature. I was happy to note in Mr. Dayton's article an indication of the return to *Acer saccharum* for Sugar Maple, instead of *S. saccharophorum* that was the vogue for a couple of years recently.

C. W. BARNEY,
Head, Dept. of Forest Management and Utilization, Colorado A and M College, Fort Collins.

[1]Dayton, William A. Geography of commercially important United States trees. Jour. Forestry 51:276-279.

[2]According to *Standardized Plant Names* the first syllable is pronounced Gwy.

[3]I am hereby casting one vote against abandoning such an euphonious name as *J. pachyphloea* for the flat and listless *J. deppeana*.

I am flattered by Prof. Barney's interest in this paper and am in pretty general sympathy with his comments. Any comment by me must be largely an *apologia pro vita mea*. The genesis of this article was an oral request of Chief McArdle for some percentages of this sort, which I did not possess at the time. I believe the percentages in the article give a tolerably close view of the situation.

I acknowledge my failure to include such outstanding species as Port-Orford-cedar, Sitka spruce, and bur, northern and southern red oaks. That is inexcusable.

With regard to Dr. Barney's specific comments:

Oregon ash *is* included; *Fraxinus latifolia* Benth. is an older name for it than *F. oregona* Nutt.

Hickories are a group that still require much more study. Thank goodness recent studies by Profs. Fernald, Manning, Palmer, and others are tending to reduce the number of species. *Carya carolinae-septentrionalis* (Ashe) Engl. & Graebn. is now generally regarded as a synonym of *C. ovata* (Mill.) K. Koch, shagbark hickory. Likewise, *C. ovalis* (Wangenh.) Ashe, a synonym of *C. glabra* (Mill.) Sweet, pignut hickory.

Nyssa biflora Walt. is generally regarded as a variety of *N. sylvatica* Marsh., appearing in Sargent's Manual and the Check List as *N. sylvatica* var. *biflora* (Walt.) Sarg. For simplicity's sake I did not list varieties separately in the paper.

Pinus leiophylla Schiede & Deppe is a Mexican species, but we do have a variety of it, Chihuahua pine [var. *chihuahuana* (Engelm.) Shaw] in southeastern Arizona and southwestern New Mexico.

Taxodium ascendens Brongn.

seems too feeble to be regarded as a distinct species. It is now pretty generally named *T. distichum* var. *nutans* (Ait) Sweet, with *T. ascendens* as a synonym.

Pinus engelmannii Carr. is the correct name for Apache pine; *P. macrophylla* Engelm. (*not* Lindl.), *P. latifolia* Sarg., *P. apacheca* Lemmon, and *P. mayriana* Sudw. are synonyms.

To the best of my knowledge, there is no such oak as "*Quercus agricola.*" Prof. Barney is right; it should be *Q. agrifolia* Née. There is another Old World *Q. agrifolia* but it is a homonym and untenable.

The name *Quercus prinus* L. has given a lot of trouble. It seems best not to discard it (as late botanists of the German school have done, as a *nomen confusum*) but to follow Fernald and others (adopting the position of old Dr. Engelmann) in referring it to the chestnut oak (syn. *Q. montana* Willd.). This parallels the restoration of *Q. rubra* L. (*vice Q. borealis* Michx. f.) for the northern red oak.

Quercus michauxii Nutt. (confused in the past with *Q. prinus* L.) then becomes the accepted name for swamp chestnut oak.

What I attempted to do in the list was to give the starred species in Sudworth's Check List. It might well be that Prof. Barney is right and that all the species listed by him (and perhaps others as well) should have been included. Some of them are certainly borderline: Yellowwood (*Cladrastis lutea*) is kind of a botanical curiosity; it is exhibited by guides in the Great Smokies almost as if it were *Franklinia alatamaha*. Lignumvitae is tremendously important in the tropics, but it seems questionable that it has (at least now) timber value on the keys off the coast of extreme southeastern Florida. I have never personally seen Table-Mountain pine of a size for lumbering; may be it is in some places. The historians tell us that the chief reason Capt. John Smith went to Virginia was to get sassafras (then considered a panacea for all the ills that man is heir to) but, aside from sassafras bark in the local markets (and indeed I am fond of sassafras tea myself), I know of no particular use nowadays of the tree. Carolina hemlock's chief commercial value is doubtless in horticulture and indeed it is probably the finest of all hemlocks for ornamental purposes. Again, Prof. Barney may well be right and that the basis of starring species in the Check List needs alteration.

I am in full personal sympathy with Dr. Barney's objections to changes in long-accepted names of important species. Dr. Little submitted to the last Botanical Congress a published proposal to outlaw alterations of names that had stood for a minimum of 75 years; it was overwhelmingly voted down. I got up on my "hind legs" in Stockholm in 1950 and appealed for a limited list of conserved species names which would preserve such long-accepted names as *Sequoia gigantea* and *Pseudotsuga taxifolia* but got nowhere! I was merely a voice crying in the wilderness of nomenclatural chaos.

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Forest Service,
Washington, D. C.

Reviews

Forest Policy.

By William B. Greeley. 278 pp. McGraw-Hill Book Company, Inc., New York 36. 1953. $5.50.

Proof that public resource policy can be described and interpreted objectively is one of many excellent features of this book. W. B. Greeley, an outstanding forester, draws on his mature judgment, experience, and devotion to conservation in presenting an unbiased, nonemotional resume of forest policy for most of the world. It is the best that has been published in this field.

Public forest policy is a most controversial subject, yet in this book Mr. Greeley presents an historical interpretation of policy in such a simple, easy-to-read, interesting and instructive manner that any existing frustration seems to evaporate. As a result the reader is left with a challenge of clear-cut enlightenment and an enthusiasm to meet these controversies objectively. One should not assume, however, that the author does not recognize the many forest problems facing the people of the world. He feels, however, that they will find logical, expedient and practical answers through the natural changes that occur in the development of any country.

In his distinctive style the author shows how forest policy in various parts of the world has arisen as a natural phase of progress, based on historical events as dictated by many complex and integrated forces of a technological, economic, cultural and social nature. For example, he says, "The most fascinating phase of forest policy is its integration with the other things going on."

In a work of four parts and twenty-four chapters the author first discusses the origin and operation of forest policies. The second part takes up the historical development of forest policies in foreign countries, having many different ideologies. The major portion of the text, however, is devoted to the development of policy in the United States. Here is woven a simple, accurate and forceful narrative, which integrates the lessons to be learned from other countries with an unbiased account of the historical development of forest policy and national progress. Outstanding is the very practical approach used in appraising the contribution of each historical phase, and the relative significance of the many implements of policy. Such implements as education, research, cooperation, public and private management and general forestry aids are accurately and objectively appraised.

Mr. Greeley states that education was the first step in American forestry and that it has run the gamut from propaganda to a realistic teaching of specific woods

practice. It has been the most distinctive and probably the most effective implement used.

Public and private cooperation as an ingredient of forest policy is discussed in relation to its historical significance. The author points out that the cooperative spirit runs through every segment of American forestry. The success and vigor of this cooperative policy, however, are probably due more to administrative procedures than to legislation.

In discussing public forest management, he commends the Forest Service for its sincere efforts in weighing the importance of different uses on each area, and giving each their merited place. A fortunate phase of national forest policy is "the flexibility of basic administrative laws which permits departures from routine procedures and the constructive handling of special situations." In referring to state forest policy, he points out the value of forestry boards as patterned after the Scandinavian countries and used in some of the states for drafting forest practices for local areas, and for their educational value. Regulatory measures are useful but careful consideration should be given to the level of government responsible for them.

The chapter on private forest management deals with factual history, and it becomes clear that present-day technology, changed economic forces, and research are dictating to many private individuals a policy which is more in keeping with social objectives and needs than has been the case in the past. This trend is specific and encouraging, and it might be enhanced by the greater use of forestry aids as carried out in many foreign countries.

Mr. Greeley has faith in the future and the American way of doing things, in spite of the rapidly increasing trend toward public and social aims of forestry and away from the individual rights and benefits accentuated by the modern socialistic trend. He points out that "the main battleground for laissez-faire is to show that it serves the public interest more effectively than a controlled economy." The final test of any system is how it works in the production of trees and other benefits rather than a "theory of government or a language of a constitution."

Truly, this book will be of interest to everyone, but particularly to college and even high school students.

ERNEST WOHLETZ.

Physiology of Seeds

William Crocker and Lela V. Barton. 267 pp. Illus. Chronica Botanica Company, Waltham, Mass. 1953. $6.50.

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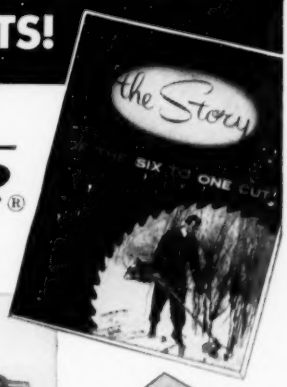

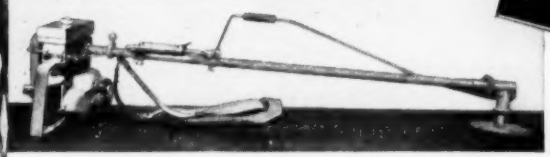

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director of the Boyce Thompson Institute for Plant Research at Yonkers, N. Y., did not live to see the appearance of the long awaited summary of his seed studies and the researches of his co-workers. Dr. Barton has, however, ably carried the work to completion. For long, and especially during the past 30 years, material on seed physiology has been accumulated including an enormous bibliography, so that the Institute is probably the greatest center for seed physiology in the world today. Accordingly, a treatise on this subject carries unusual weight of authority.

But Miss Barton points out in the preface that a book of this size must not be considered a treatise but more in the nature of an outline or summary. In view of the wealth of material upon which to draw, even the 1,100 references cited appears small. Hence no exhaustive historical treatment was attempted nor have all facets of the subject been covered. The book is written quite frankly for the physiologist and investigator with emphasis on the biochemistry of seeds. While the nurseryman or forester may find it difficult reading, many practical applications are cited along with the more theoretical results.

The outline of the book follows much the plan of classical physiology texts, with chapters on chemical composition, water relations, respiration, influence of various factors on germination, dormancy and life span and metabolic changes during development and germination. Final chapters discuss vernalization and seed transmission of disease.

Anatomy of seeds is briefly covered in an introductory chapter, followed by a discussion of factors affecting seed production. Here considerable space is devoted to the production of hybrid seed and to the phenomenon of asexual seed formation or parthenogenesis. As elsewhere in the book, illustrations are drawn chiefly from agricultural seed, and only rarely are tree seeds mentioned. This reflects of course, the greater economic importance of agricultural seeds especially the grains used for food.

Water relations however, touch on matters that are important in tree seeds. For instance, the question of soaking seeds in water as a means of hastening germination seems in need of clarification. Many species are injured by soaking, while others are hastened in germination as has been shown by recent Swedish works published since the present book appeared.

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factors affecting germination include such subjects as penicillin, heavy water, radioactive compounds, and atomic rays. The mechanism of dormancy in seeds had long been a subject of special study by Dr. Crocker and later by others at the Institute. Some tree seeds come in for mention here, and the table illustrating moist-low temperature treatment to promote after-ripening lists a majority of tree seeds that have been reported as responding to such a process.

Rapid viability tests are dismissed in one page and other tests of germination, purity tests, etc., are obviously outside the scope of this text. However, in view of the biochemical factors involved in staining tests it is regretted that a fuller exposition could not have been provided of this most interesting subject, which holds much promise for giving quicker reports of seed viability than possible with usual germination tests. More than anything else, probably, the long time required for germination tests has retarded more general testing of forest tree seeds, especially in North America.

Storage of seeds, including tree seeds, is a subject currently being actively pursued by Dr. Barton at Boyce Thompson and some new and unpublished data are presented showing the superiority of storage below freezing at low humidities. The rapid deterioration of seeds removed from such storage if humidity is increased has been well demonstrated.

Chemical changes accompanying after-ripening and germination and the role of different enzymes are ably discussed. This is an important chapter to the physiologist, and indicates the complexities of the changes occurring even in such relatively simple organisms as seeds. The fascinating subject of embryo culture throws much light on the causes of dormancy and offers great promise for solving certain problems in genetics.

Seed-borne diseases are considered, especially from the standpoint of the physiological effects of various treatments used to control them. The effect of such treatment depends not only on the substance used, but on the condition of the seed; environmental conditions are also of prime importance. It is significant that no tree seeds are mentioned. Tree seeds have been less studied in this connection than other seeds.

This book will be a valuable addition to the library of all research workers, especially foresters working with tree seeds. It will furnish

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background material and suggest new lines of attack in studying puzzling behavior of some little-known seeds. With the high cost of tree seeds, improved methods of storage especially are very important. This book meets the need for basic physiology of seeds that points the way for future research.

HENRY I. BALDWIN.

❦❦❦

Planning and Control in the Managed Forest.

By Hermann Knuchel. Translated in English by Mark L. Anderson. 360 pp. Illus. Oliver and Boyd, Edinburgh and London. 1953. 35 shillings.

This latest text on forest management is the English translation of the original work *Planning und Kontrolle im Forstbetrieb* by Hermann Knuchel, formerly professor of forest management at the Federal Institute of Technology in Zurich, Switzerland.

For many years American foresters have shown a keen interest in the system of management known as the "méthode du contrôle" or the continuous inventory system. The main theme of the book centers on the application of this system to the management of mixed uneven-aged forests as contrasted to systems of management chiefly based on the rotation concept. With the creation and development of uneven-aged forests of the type of selection, group selection and group shelterwood-forest, new methods of management and forest regulation had to be developed to take the place of the many methods of German origin characterized by such names as allotment-age class- and stand-method.

The continuous inventory system proved to be well adapted to fill this need. However, it took a lifetime of struggle and teaching to secure recognition for a new school of thinking in forest management. If, in Switzerland, management planning and control are in agreement with the prevailing silvicultural systems used, this accomplishment is chiefly due to the efforts and teachings of Biolley, Favre, and Knuchel.

The book is divided into three parts: theoretical foundations, the preparation of the management plan, and practical example. In the chapters dealing with the objects of management, sustention (a term used by the translator in place of sustained yield), and the length of the production period, the nature of forest production as contrasted with other fields of economic production is analyzed. Great emphasis is placed on the obligation of any forest owner to manage his forest for the greatest benefit to all.

In Switzerland sustained yield management is assured by law. Although working under an established system of public regulation, the forest officers are by no means confined to a regulated line of action "in such a manner that they become degraded to mere executive organs of a centrally con-

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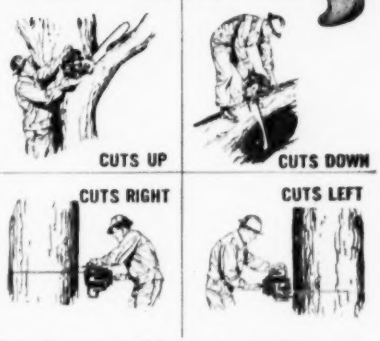

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trolled planning bureau." Knuchel emphasizes that the executive officers should themselves draw up the management plans, or at least take a leading part in their preparation, since they know the forest best. It is especially necessary that they should cooperate in the silvicultural planning, in the fixation of the prescribed cut, in the felling plan and in the planning of the general road system.

The chapters, entitled The Normality of Forests, The Actual Growing Stock, and The Increment, contain a thorough treatment of the Foundations of forest production, discussing at great length the economic and the technical (mensurational) problems involved. Under the title, Methods of Yield Regulation, the author discusses the older area and volume allotment methods, certain formulas for the calculation of the periodic yield, the French volume method, the use of diameter distribution curves in selection forests, and silvicultural procedures comparable to our cut and leave system.

A long chapter is dedicated to the continuous inventory system, translated as the *check method*, which is considered to represent "a combination of silviculture and increment control for the attainment of the highest possible effectiveness." The mensurational aspects of the system are again presented in great detail.

The second part of the book on the preparation of management plans is brief and to the point. The various controls and records to be maintained on a managed forest are discussed, and suitable forms are indicated. Special sections deal with the subdivision of the forest, the layout of road systems and other improvements, and with the special description of the forest by blocks or compartments.

The practical example given at the end of the book is the work of forest engineer D. Steiner and refers to a community forest of 350 acres. This management plan is representative of the type of plan prepared for intensively managed forests in Switzerland.

Although the thoughts and methods presented in Knuchel's book are not applicable everywhere, the broad and thorough treatment of the subject of planning and control in uneven-aged forests provides a stimulating and rewarding study for foresters throughout the world. Professor Mark L. Anderson of the University of Edinburgh deserves great credit for translating the original German text and making it available to the English speaking world.

H. ARTHUR MEYER

Plant Diseases in Orchard, Nursery, and Garden Crops.

By Ernst Gram and Anna Weber. 618 pp. Illus. Philosophical Library, New York. 1953. $18.50.

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Gram and Weber's book is a monumental reference work and a useful practical manual. It was originally written in Danish, dealing largely with continental conditions. The second edition (1944) was translated to English by Evelyn Ramsden, and edited and adapted to English conditions by R. W. G. Dennis. The principles developed, and the treatment given most of the infectious, deficiency, and excess diseases, are applicable to the United States.

In the first part of the book, generous and competent treatment is given to the nature of diseases, to physiogenic disturbances, and particularly to nutritional deficiencies and excesses. The second, third, and fourth parts deal respectively with diseases of tree and bush fruit, diseases of vegetable and herbaceous fruit, and diseases of ornamental plants and trees. The fifth part deals with control measures in general. Specific control measures are discussed for each disease for which a control is known. There is no discussion of nematode diseases.

Early in the book detailed treatment is given a few diseases of great importance on a wide variety of hosts, such as Botrytis blight, rusts, Verticillium wilt, and seedling diseases. Following this, host plants are arranged alphabetically and the common diseases described under each. Diseases serious on more than one host are described once and cross-referenced thereafter. In addition to the descriptions, illustrations and control measures, a key for disease diagnosis is provided under important crops with many diseases. An outstanding example is the apple, with 41 detailed disease descriptions, with control measures, 8 pages of color plates, 37 black and white illustrations, and a key to 60 apple disorders.

Although the emphasis on certain diseases is of course somewhat different than would be given in a manual written for North America, it is notable that such large percentages of the diseases are equally major or minor on the two continents. In the case of tree diseases this is less true, because Europe has so few tree genera compared to North America. The authors have not attempted to discuss their tree diseases from the standpoints of silviculture and forest management. Rather, they have stressed cause, importance, diagnosis, etiology, and fairly direct method of control. The diseases of 25 genera of forest and shade trees are discussed.

To the American in year 1953, the section on control seems somewhat outdated, with heavy emphasis given the older fungicides such as Bordeaux, corrosive sublimate, and lime sulfur, whereas the thiocarbamates, so widely and successfully used here are dismissed as "compounds of iron and zinc which show some promise as fungicidal sprays for fruit", and the use of modern soil fumigants against soil-

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borne pathogenes is not mentioned. Several trade names of fungicides are listed simply as "a proprietary (sulfur or copper, etc.) fungicidal spray."

Considering the entire field of plant diseases, the book is outstanding for its completeness, its 342 excellent black and white illustrations and many color plates, its unostentatious yet precise language and practical suggestions and remedies, its extensive bibiographies, the very high-grade paper used, and the excellent printing and figure reproducing job.

Gram and Weber's book is a very valuable tool for all teaching, research, and extension pathologists, and others who have to do with the diagnosis and treatment of the diseases of a wide variety of plants. For the forester who is concerned not only with the trees under his care but with the garden, orchard, and nursery problems about him, this volume will be of encyclopedic value.

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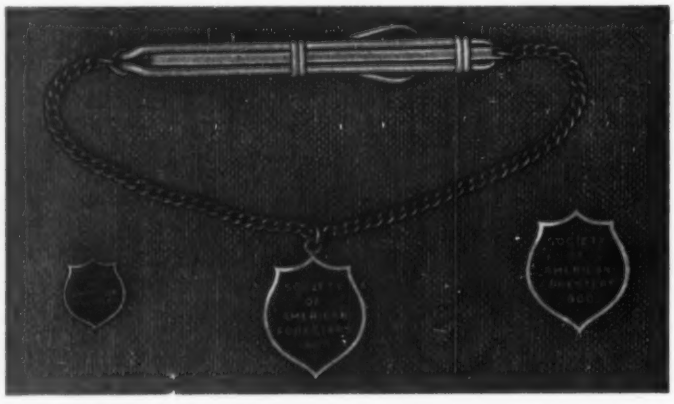

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Publications of Interest

The Northeastern Lumber Manufacturers Association has released a revised edition of a sound-color movie entitled, *Story of Wood in the Northeast*. Filmed and produced by Dr. William M. Harlow of the State University of New York College of Forestry, it was first released in 1946.

The producer has made use of up-to-date film production methods. The narration is excellent without being overdramatic, and picture sequences flow cleanly and without jerkiness from one scene to another.

A good approach to audience interest is the story of the development of the peavey and how it was improved to give loggers one of their finest and most useful tools. After some superb color shots of stream flow, the film follows the tree from forest to mill, first contrasting the use of the crosscut saw with the power saw in felling and bucking. The film emphasizes the economic importance of trees native to the Northeast—yellow birch, sugar maple, and white pine in particular. It gives attention to the manufacture of furniture, the close utilization of thinnings from red pine plantations, and manufacture of hardwood plywood. It does a first-rate job in spotlighting lumber manufacturing in the Northeast, and emphasizing wood as "the material of a thousand uses."

The film runs approximately 31½ minutes. It is available through the N.L.M.A., 271 Madison Ave., New York.

FLOYD C. CARLSON

• • •

Forest Photos For Editors is the 1953-54 edition of the American Forest Products Industries, Inc., brochure describing and presenting samples of photographs available through their free photographic service. The existence of this free service for editors, publishers, writers, artists, and educators should be of interest to professional foresters whose work brings them in contact with these people. The A.F.P.I. is located at 1816 N St. NW, Washington 6, D. C.

Reports of the Pacific Northwest Seeding and Planting Committee on Recommended Reforestation Practices and Techniques is one of a series published for the use of field foresters by the Western Forestry and Conservation Assn., 712 U. S. Nat'l. Bank Bldg., Portland 4, Ore. Chapters deal with nursery practice; cone collection, preparation and storage; direct seeding of forest lands; planting equipment; factors affecting plantation survival; seedling strains and origin; and reforestation surveys. Public and private practising foresters from the U. S. and Canada comprised the committee making the recommendations. The price is $1.75.

* * *

A booklet which explains services offered to private landowners by pulp and paper companies throughout the South has recently been issued by the Southern Pulpwood Conservation Assn. It emphasizes the great importance of the private owner to the pulp and paper industry and seeks to show him how he may increase the value of his tree crop. The booklet, *Who is This Man?*, may be obtained from the S.P.C.A., 1224 Peachtree Street, N.E., Atlanta 1, Ga.

* * *

The July, No. 48, issue of *The Unit*, published by the Southern Pulpwood Conservation Association is devoted to reporting the prepared papers and discussion resulting from their recent four area meetings. A number of interesting items including a discussion of hardwood control and utilization are contained. The association's address is 1224 Peachtree Street, N.E., Atlanta 1, Ga.

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Current Literature

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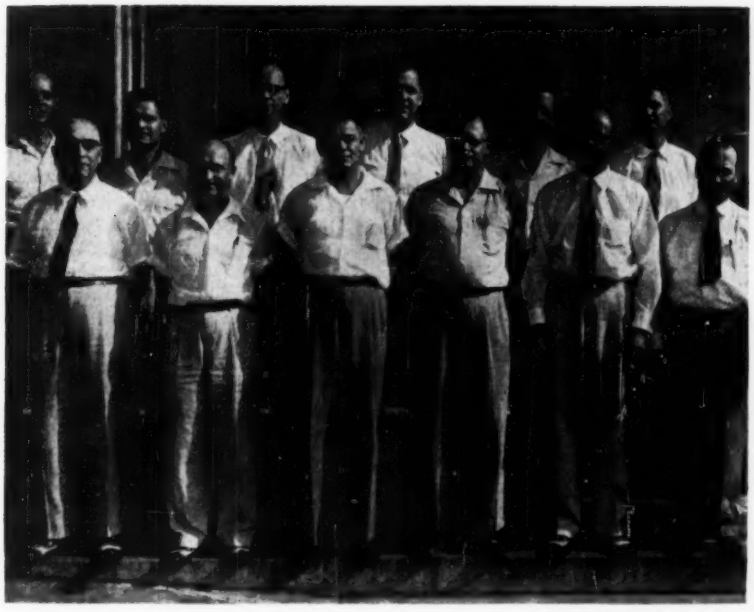

Photo by Asheville Citizen

MEMBERS of a newly formed "Hickory Task Force" met in Asheville, N. C., July 23 to organize a program for stimulating industrial use of medium and low-grade hickory that is plentiful and increasing in eastern hardwood forests. (Left to right): E. T. Merrick, publications editor, Southeastern Forest Experiment Station, Asheville; C. E. Libby, professor of pulp and paper technology at N. C. State College, Raleigh; George H. Englerth, Forest Utilization Service, Southeastern Forest Experiment Station, Asheville; Roy M. Carter of N. C. State College School of Forestry; John T. Drow, Forest Products Laboratory, Madison, Wis.; James Renshaw, Head, Southern Appalachian Research Center, Asheville; W. N. Darwin, chief, Forest Utilization Section, TVA, Knoxville, Tenn.; Walton R. Smith, Forest Utilization Service, Southeastern Forest Experiment Station, Asheville; James Cruikshank, chief of the Division of Forest Economics, Southeastern Forest Experiment Station, Asheville; Richard D. Lane, Central States Forest Experiment Station, Carbondale, Ill.; George H. Hepting, pathologist, Department of Agriculture, Asheville; Mark M. Lehrbas, Forest Utilization Service, Southern Forest Experiment Station, New Orleans, La. Absent from the picture are: Roger Anderson, Duke University; and Monie Hudson, Taylor-Colquitt Company, Spartanburg, S. C.

Minnesota School of Forestry Announces Fiftieth Anniversary Celebration

The School of Forestry at the University of Minnesota has announced a celebration of the completion of the first fifty years of professional forestry training at the University. The 50th Anniversary Celebration, planned for October 23 and 24, will be the occasion for a large number of alumni of the school to gather on the St. Paul campus of the University to renew old acquaintances and to discuss the progress being made in forestry.

Highlight of the two-day celebration will be a panel discussion of "Forestry in Minnesota—Past, Present, and Future." In this discussion, representatives of state, county, and federal agencies and of private forest-owning interests will describe the past development of their programs, and, against this background, explain the direction in which their plans for the future are leading the expansion of forestry activities. This program should contribute to an understanding of Minnesota's forest resource problems by the people of the state. It should also aid in the coordination of forestry activities among agencies and individuals, and may help to form a foundation for some comprehensive re-examination of forest policies in the state. The growing, harvesting, and manufacturing of wood products is the third largest industry in Minnesota, and the entire problem of management of the forest resources of the state is presently under study by the Interim Committee on Forestry of the state legislature.

Other features of the celebration will be a banquet for School of Forestry alumni and guests, several talks

PUBLIC AUCTION SALE OF PINE PULPWOOD

Tennessee Valley Authority will sell approximately 18,000 cords of pine pulpwood at public auction at Knoxville, Tennessee, on October 15, 1953. Pulpwood is in plantations and natural stands located on TVA lands in Alabama, Georgia, Mississippi, and Tennessee.

Trees to be cut will be marked by TVA on selective cutting basis to improve stands for ultimate harvesting as sawtimber. Most of the material is in plantations—loblolly, shortleaf, and Virginia—which have reached a size where thinning is required to maintain growth and utilize low vigor trees. Pine stands range from 1 acre to 200 acres in size, averaging about 14 acres. Volume to be harvested ranges from 1 cords to 18 cords per acre, averaging about 6 cords. The pulpwood is to be harvested during a 5-year period beginning January 1, 1954. Complete information on the offering is contained in a prospectus, copy of which may be obtained by writing J. Ed Campbell, Director of Reservoir Properties, 530 New Sprankle Building, Knoxville, Tennessee.

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on the use of wood in home design and decoration, conducted tours of the Lake Vadnais plantations, informal tours of both the St. Paul and Minneapolis campuses, and the football game with the University of Michigan. Outstanding achievement awards will be presented to several alumni of the School of Forestry by President James L. Morrill of the University. Henry Schmitz, director of the School of Forestry from 1925 to 1947, and now president of the University of Washington, will be the main speaker at the banquet. Dr. Schmitz was editor of the JOURNAL from 1937 to 1942, president of the Society from 1942 to 1945, and is a Fellow of the Society.

Actually college level forestry courses were offered at Minnesota before 1903. The Department of Horticulture gave such courses in the 1890's, and the first forestry course was offered on the campus for the Vocational School of Agriculture in 1889. This same course, continuously modernized in content, is still offered by the School of Agriculture, and may be the oldest currently taught forestry course in the country. In the fall of 1903 the young College of Agriculture first offered the Bachelor of Science degree with a specialization in forestry. In 1905 the first forestry degree was given to Harold Cuzner, who has been associated with the Forestry School of the University of the Phillipines since shortly after receiving his degree at Minnesota.

The founding of the School of Forestry was the result of the pioneering enthusiasm of Samuel B. Green, head of the Horticulture Department of the University from 1890 to 1910. He foresaw the need for better management of the forest resources of the country and the need for men trained to carry on this management. Not only was he responsible for establishing forestry training on the St. Paul campus, but he initiated the summer school courses in forestry at Lake Itasca and was instumental in obtaining the land on which the Cloquet Experimental Forest is located. Green was a strong believer in practicality, even in college training, so he emphasized the field work for the early students and personally took them on many trips to visit the winter-time logging operations that were making Minnesota one of the leading lumber-producing states at that time.

From the small beginning enrollment of seven students in 1903, the number climbed to a peak of 455 during the 1930's and an almost equal peak just after the second World War. The largest graduating class was 92 students in the spring of 1950. The 1,230 graduates of the School have not only gone into all kinds of work in the growing and harvesting of trees and the management of forest lands, but also into all the many lines of work with forest products, from the manufacture of plywood and paper to preservative treatment and lumber and other forest products sales. Minnesota forestry graduates are found in all of the eleven forest experiment stations of the U. S. Forest Service, at the Forest Products Laboratory at Madison, Wisconsin, and on the faculties of 19 of the 25 accredited forestry schools in the country.

Lightning Sets Record Number of Fires in West

A prolonged drought, coupled with lightning storms, combined to make a one-week period in August the worst on record for forest fires in the far west, with more than 1,500 reported during a single week in Montana, Idaho, California, Washington and Oregon.

Forest Service records show that California alone reported 197 lightning fires on one day, and 137 the next.

Pauley, Carr, and Christian Become F.P.R.I. Officers

R. D. Pauley, Weyerhaeuser Timber Co., Tacoma, Wash., was elected president of the Forest Products Research Society for 1953, at the seventh annual meeting of the society in Memphis, June 15-17. Retiring President K. G. Chesley, Crossett Industries,

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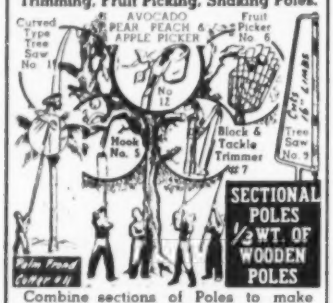

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Crossett, Ark., was named to the society's board of directors.

Other newly elected officers are: president-elect, L. J. Carr, L. J. Carr and Co., Sacramento; vice president, Moss B. Christian, Chicago Mill and Lumber Co., Tallulah, La.; and directors, Fred Armbruster, Dow Chemical Co., Seattle, and R. E. Schreck, Union Lumber Co., San Francisco.

Association of State Foresters to Meet

The annual meeting of the State Foresters will be held at the Cumberland Falls State Park in Kentucky on October 6, 7 and 8. The session will begin at 9:00 A.M. on the 6th and end about 5:00 P.M. on the 8th following a field trip.

A cordial invitation to attend is extended to those persons interested in state forestry programs. The conference will consist of general sessions at which the public is welcome, and executive business sessions. Arrangements for lodging and meals should be made direct with the Manager of the Cumberland Falls State Park, at Corbin, Kentucky.

Snake Bites Author of Snake Article

David A. DaLie, author of the article "Poisonous Snakes of America" which appeared in the April issue of the JOURNAL, suffered a could-have-been fatal bite from a water moccasin the first week in August. DaLie, wildlife director of the Okefenokee Swamp Park at Waycross, Ga., was in the process of attempting to capture a large water moccasin for the park collection when a smaller, unseen, sank his fangs into the naturalist's leg just above the ankle.

DaLie practiced what he preaches. He instantly slashed the wound with his pocket knife, applied a tourniquet above his knee, sucked the blood and poison from the cut, and administered to himself from the snake bite kit which he always carries.

After several hours he recovered from "blind spots" and was able to operate his outboard motorboat and then drive his automobile some 35 miles back to the park office, arriving weak and dizzy, and with a badly swollen leg. He was back on the job the second day.

This is DaLie's second bite from a poisonous snake in his eight years of work at the park.

Forest Credit Bill Becomes Law

With Presidential signature of H.R. 5603, the Forest Credits bill, bankers are now enabled to give support to forest management and to encourage the tree grower by providing credit facilities not heretofore available. The bill, which amends Section 24 of the Federal Reserve Act, was introduced by Congressman Ellsworth of Oregon. The Forest Credits Committee of the Western Forestry and Conservation Association and the Oregon Bankers' Association appeared before the Banking Committees of the Senate and the House in support of the bill. Additional support was given by industry, forestry organizations, the Association of State Foresters, and by bankers associations throughout the country.

National banks, under the provisions of this law, may make a 2-year loan on managed forest property, using timber as collateral. A mortgage up to 10 years may be made, under the terms of which the installment payments are sufficient to amortize the principal of the loan in 10 years by 10 percent each year.

Passage of this bill marks a milestone in forestry history and brings the banking law up to date with forestry progress.

Helicopter Used to Lift Lookout

A complete standard lookout house, including gravel, lumber, cement and all other materials and supplies was shuttled to the top of Saddle mountain in Oregon, a 3,300-foot peak in Clatsop County, a short time ago by helicopter airlift. The total estimated weight of all materials transported was over 21,000 pounds.

The base for the project was on the west side of the mountain some 1,633 feet below the summit. It required over 100 trips to get all the materials on top.

In making the original plans for the lookout the most difficult problem that faced Ed Schroeder, district warden for the Northwest Oregon State unit, was the matter of transportation. The summit could be reached only by a steep rough trail that was passable only by foot or by pack horse. This was three and one-half miles in length.

Schroeder then went into the matter of the airlift and found that the cost would be far less than any pack string or getting men to carry the materials to the summit. With the airlift, the carpenters started the work immediately.

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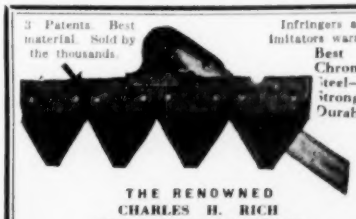

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Wildlife Management:

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By REUBEN E. TRIPPENSEE, University of Massachusetts. *American Forestry Series.* 479 pages, $6.00

Here is a simple, direct, quantitative approach to the process of making the land produce sustained crops of wild animals. The book gives a summary of the life histories of important game animals of North America, with techniques for their management. It also discusses the farm, the forest, and wilderness conditions as these relate to wild animals, and suggests ways whereby the land manager can make his holdings tenable for occupancy by wild animals.

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This second and final volume of the authoritative study brings together concisely the pertinent facts on management of water and wet lands; life histories, ecology, and management of fur bearing animals, waterfowl, and freshwater game fish, and presents necessary procedures for their abundant production and orderly harvest. Descriptions of their habitats are also included. Outstanding illustrations show points of both beauty and interest.

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I. F. Eldredge Receives Honorary Degree

Inman Fowler Eldredge, consulting forester of New Orleans, was granted an honorary degree of Doctor of Forest Science during the annual commencement program of the North Carolina State College in June.

Dr. Eldredge was presented for the award by Dean Richard J. Preston of the School of Forestry who said, in part,

"For many years, Mr. Eldredge has been a beloved and respected leader in the forestry profession. He is a Fellow in the Society of American Foresters. He has served as member of the Board of the Charles Lathrop Pack Foundation, the Southern Division of the Natural Resources Planning Board, the New Orleans Academy of Science and the New Orleans Plant Society. Mr. Eldredge is author of more than forty professional articles. No other man has had more important influence in pointing out the great opportunities for forestry in the South and in bringing the pulp and paper industry into this region. In honoring Mr. Eldredge, North Carolina has the privilege of honoring one of the great pioneers of forestry in America."

Mr. Eldredge received the bachelor of forestry degree from Biltmore Forest School in 1905. He entered the Forest Service upon graduation and served as supervisor of the Florida National Forests, regional chief of forest management, and forest inspector, until 1926 when he became manager of the Suwannee Forest, one of the first privately managed forests in the South. He re-entered the Forest Service in 1932 as regional director of the Forestry Survey. He retired in 1944, and has remained active since then as a consulting forester.

France Honors Enrique Beltran

Enrique Beltran, Mexico, Honorary Member of the Society of American Foresters, has been awarded the grade of Chevalier in the Legion of Honor by the Government of France. This honor was bestowed because of Professor Beltran's "exceptional service to science." He has also recently been appointed to serve on the Advisory Board of the Charles Lathrop Pack Forestry Foundation, and is a member of the Executive Board of the International Union for the Protection of Nature.

Tom Gill Honored

Tom Gill, Chairman of the S.A.F. Committee on International Relations, was given the degree of Doctor Honoris Causa on July 25th by the University of the Andes, in Merida, Venezuela. This is the second award of the honorary degree in the 168-year history of the university, and was the first ever made to a non-Venezuelan.

The degree together with a gold medal was presented in recognition of Mr. Gill's work in the field of international forestry, and the presentation was made in the Great Hall of the University Council on the occasion of the graduation of the second forestry class to be trained by the University's Faculty of Forestry Sciences. The United States Embassy in Venezuela was represented at the ceremony by the First Secretary, Joseph F. McEvoy, and the Cultural Attache, Dr. Albert Harkness.

Dean Alfredo Rivas Larralde and the Director, Marshall Turner, represented the Faculty of Forestry Sciences. This school was recently designated as a forestry training center for F.A.O. in Latin America.

Government

Spruce Access Roads Programmed

Spruce access road funds, totalling $8,428,500, have been appropriated by Congress to fight the beetle epidemic in northern Idaho and western Montana, reports Regional Forester P. D. Hanson of the Forest Service, Missoula. He said these funds have been programmed to accomplish a substantial part of the $10,000,000 access road job which is considered essential if control of the epidemic of spruce bark beetles is to be obtained. The road plan was developed last winter in cooperation with the timber operators and the Bureau of Entomology and Plant Quarantine. The plan calls for logging operators to spend up to $5,000,000 on additional roads for the same purpose. Hanson states that control by logging of infested trees will be supplemented with control by trap trees and chemical treatment, to some degree yet to be determined.

First funds for construction or betterment of spruce access roads became available in May and the last in late July.

Bernard L. Orell

New Supervisor for Washington State Forestry Work

Bernard L. Orell, supervisor of the Washington Division of Forestry, Department of Conservation and Development, since June 1949, resigned his position in August.

Orell is leaving state government to take a position with the Weyerhaeuser Sales Company at St. Paul, Minnesota. He will make his residence there and will represent the Sales Company in matters relating to natural resources.

To succeed Orell is **L. T. Webster**, deputy supervisor of forestry since July 1949, who for more than 20 years has been associated with the Division of Forestry.

Webster is a graduate of the University of Washington College of Forestry. He received his Master of Forestry degree in 1931.

Previous to his employment with the division he held positions in private industry, in the Washington Forest Fire Association, and the State Parks Department. In the Division of Forestry he started as field assistant, then became assistant supervisor of forestry from which position he was promoted to deputy supervisor in 1949.

Orell and Webster together have headed up the state's forestry program during a period which has seen the material strengthening of the forest fire control program in both the fields of fire suppression and fire prevention, according to W. A. Galbraith, director of the Department of Conservation and Development.

Fire equipment has been brought up to date, additional pieces have been added, the radio network has been modernized. In addition, slash laws, burning permits and laws relating to logging operations have been reinforced.

"The Division has compiled an enviable record in spite of unusual fire seasons from a fire weather standpoint," Galbraith indicated. "This was particularly true in the seasons of 1951 and 1952. The lowest record of any year in acreage burned was attained in 1950.

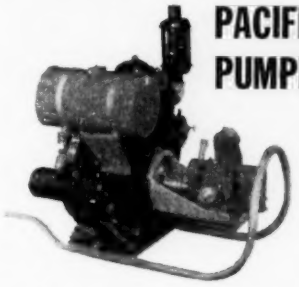
"Legislative sessions of 1951 and 1953, upon departmental recommendations, have strengthened and brought up to date the forest fire code, the forest practices act, and also passed an important forest insect and disease control act. The Division of Forestry will also be embarking on a rehabilitation program for the Yacolt burn, something that has long been needed and which if carried to its conclusion will add materially to the economy of the state.

"During his administration Orell established a strong personnel program, resulting in the ability to employ and retain high-calibre men in the field forces and in high morale in the division."

Orell came to the Division of Forestry from the University of Washington where he was an assistant professor of forestry. He is a graduate of Oregon State College of Forestry. He has worked for the United States Forestry Service and for the State Forestry Department in Oregon.

L. T. Webster

The New GA-8 PACIFIC PUMPER



Now in regular service and field tested and approved, the new "GA-8" is showing itself to be another top performer in the famous PACIFIC PUMPER line.

With or without electric starter* the lightweight "GA-8" is especially adapted to tanker use . . . as a portable unit the special sled-type mounting means easy handling in rough terrain. Light enough to be readily carried, the air-cooled, 4-cycle engine develops top volume and pressure for its weight.

The engine and pump are standard Pacific Units and have been fully tested and approved.

*Optional equipment.

DIMENSIONS

Length	28¾ inches
Width	19¼ inches
Height	24¼ inches

NET WEIGHT

GA-8 (without starter)	115 lbs.
GA-8-S (with starter)	140 lbs.

PERFORMANCE

Pressure	G.P.M.
50	26
100	24
150	22
200	21
250	20
300	16

Normal operation is 20 G.P.M. at 250 lb. pressure

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This month, a sort of anniversary for our "What Do You Think?" column, gives us an opportunity to thank you for your contributions during the column's first year. We set it up to serve as a clearing house for your professional problems and ideas. You've made it that, and more.

Your comments have helped us to make SOUTHERN GLO more truly represent your need in tree-marking paint.

Write for new folder "Southern Glo tree marking paint."

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Dept. 0-2, Sumter, South Carolina

W. R. Smith New Chief, Forest Utilization Service

Walton R. Smith has been promoted to chief, Forest Utilization Service of the Southeastern Forest Experiment Station, Asheville.

Mr. Smith has been with the Forest Utilization Service since its organization in 1922, except for two years spent as president of the Walton Lumber Co., Mebane, N. C.

He is a graduate of the North Carolina State College School of Forestry, and has been with the Forest Service for 18 years, principally in the southern states.

Ky. District Forester Appointed

Wallace L. Disney, who has been service forester at Hazard, Ky., for the last year has been appointed district forester of the Southeastern Kentucky Forest District according to State Director of Forestry Harrod B. Newland.

Alan E. Sturdivant, who has been supervisor of the Kentucky Ridge Forest, Pineville, will go to Hazard in Disney's old position.

As district forester—the first ever named for the Southeastern District—Disney will have charge of all state and private forest matters for a 10-county area including fire control, reforestation, forest management, and administration in two state forests in the district.

Killough and Schwan Sent To Israel & Saudi Arabia

John R. Killough, Bureau of Land Management, and Herbert E. Schwan, Wildlife and Range Management Branch of the Forest Service, have recently been appointed to posts in the Near East.

Mr. Killough, range conservationist with the B.L.M., has joined the technical cooperation mission of the Foreign Operations Administration in Israel. He has a B.S. degree in forestry and range management from Utah State College, and has also attended Colorado State College.

He has been with the Bureau of Land Management since 1948, with previous experience in the Indian Service and the Grazing Service.

Mr. Schwan, who has been with the Wildlife and Range Management Branch for 17 years, has joined the technical cooperation mission of the Foreign Operations Administration in Saudi Arabia.

He has been with the Forest Service since 1922, and is a graduate of Montana State University with degrees in botany and forestry.

Forest Service Announces Transfer of Hixon, Parke & Cook

Promotion and transfer of two members of the Forest Service's Portland, Ore., staff and addition of a new staff member, have been announced by Regional Forester J. Herbert Stone.

Homer J. Hixon, Division of Timber Management, has become supervisor of the Gifford Pinchot National Forest, succeeding Laurence O. Barrett, who recently became supervisor of the Snoqualmie National Forest.

Mr. Hixon is a graduate of the University of Washington forestry school. He has worked for the Seattle Water Department, the Indian Service, and has held positions in the Gifford Pinchot, Rogue River, Colville, and Mt. Baker National Forests.

William N. Parke, Division of Recreation and Lands, has been made staff officer in charge of fire control and range management, for the Snoqualmie National Forest. He replaces Henry A. Harrison, now supervisor of the Mt. Baker National Forest.

Mr. Parke is a graduate of the Oregon State College School of Forestry. He entered the Forest Service in 1933 and has worked in the Willamette, Mt. Baker, and Mt. Hood national forests. He has worked for the Division of Lands in the Alaska region, and on the Aircraft Warning Service project of the National Defense program.

Howard C. Cook, formerly in the Forest Service Milwaukee office, has been appointed to the Division of Timber Management to replace Homer J. Hixon.

Mr. Cook is a forestry graduate of the Michigan State College and began his Forest Service career in 1931. He has worked in national forests in Michigan, Ohio, and Missouri, before going to the Milwaukee regional office, Timber Management Division.

Federal Service Retirements

William P. Kramer, Chief, Division of Operations, U. S. Forest Service, retired July 3 after 34 years of service. Last spring he was awarded a Superior Service Award by the Secretary of Agriculture, "For unusually valuable developments in administrative management, and for maintaining a consistently distinguished level of effective administration." Gordon Fox has taken over as acting chief of the division.

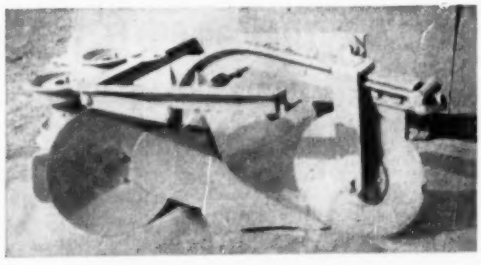
LeRoy D. Arnold, Chief, Branch of Forest and Range Management, Bureau of Indian Affairs, retired on July 31. He started with the Indian Service in 1917, and has been serving as chief of the branch since 1941.

Leslie S. Bean, inspector, Forest Service, retired July 31 after a long and varied career with the service.

Robert W. Shields, assistant regional forester, Division of Operations of the Eastern Region has retired with 42 years of service.

William G. Guernsey Becomes B.L.M. Regional Administrator

William G. Guernsey, former assistant regional forester of the intermountain region of the Forest Service, became regional administrator, Bureau of Land Management, Portland, Ore.,



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on August 1. He succeeded Roscoe E. Bell.

Mr. Guernsey, who has been in government service for more than 25 years, is a graduate of the University of Idaho, with a B.S. in forestry and grazing, and is a Navy veteran of both world wars.

U.S.D.A. Announces National Forest Earnings for 1952

The country's 152 national forests earned approximately $76.5 million between July 1, 1952 and June 30, 1953, principally from the sale of timber. This is $5 million more than the forests took in during the previous year.

Although the greatest source of revenue from the national forests last year was timber, approximately $4.5 million was collected as fees for grazing cattle, sheep, horses, and goats. Another $1 million was collected from other land leases, including summer home sites, resorts, water power rights and mineral rights.

At the time of collection, all receipts are deposited in the U. S. Treasury. Twenty-five percent of these funds will be distributed to the states in which national forests are located.

A. W. Lindenmuth to Do Fire Danger Research in N. M.

Anson W. Lindenmuth has been transferred from the Southeastern Forest Experiment Station to Albuquerque, N. M., where he will do fire research in the development of a fire danger rating system for Arizona and New Mexico. His chief work at the Southeastern station has been in the station's division of fire research, where he developed techniques now used in some 600 fire danger stations throughout the U. S.

Education

State College of Washington Faculty Changes

James W. Stubbs, Instructor, Department of Forestry and Range Management at the State College of Washington since 1947, has resigned to become Field Representative for Western Forest Industries Association of Portland, Oregon. His first appointment at the college was as extension forester in 1940-41, before his period of service with the Air Force.

Dr. Richard W. Dingle, who has been on the staff of the University of Missouri, has been appointed as Assistant Professor of Forestry and Assistant Forester in the Experiment Station and will take over his duties at Washington September 1. Doctor Dingle has his B.S.F. from the University of Minnesota and his advanced degrees from Yale University School of Forestry. At the State College of Washington he will devote considerable time to research in reforestation in the Ponderosa pine type.

Honorary S.A.F. Member Heads New Council

Announcement is made that Dr. Wilson Martindale Compton, formerly president of the State College of Washington, has assumed the duties of president and chief executive officer of the Council for Financial Aid to Education, Inc. The headquarters office of the council will be established in New York City.

The council was incorporated by an interested group of business executives in an endeavor to aid in securing increased financial support for higher education in this country, particularly through corporate gifts to privately

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supported colleges and universities. Many such educational institutions today are faced with serious financial problems.

Dr. Compton is widely known in educational circles, and is the author of a number of books and articles on scientific, economic, and business topics. A graduate of Wooster College, he took his Ph.D. degree at Princeton, followed by a law degree at Hamilton College of Law in Chicago.

After a few years as a teacher of economics and political science at Princeton and Dartmouth, Dr. Compton served 27 years, from 1918 to 1944, as the general manager of the National Lumber Manufacturers Association. He was the founder and, until 1945, the president of the Timber Engineering Company and a principal initiator of the system of American Tree Farms. In 1944, he became president of the State College of Washington at Pullman, resigning that office in 1951 to take an important government post in Washington, D. C., in connection with the national security program as administrator of the U. S. International Information Administration.

He is a brother of Dr. Karl T. Compton, formerly president of the Massachusetts Institute of Technology, and Dr. Arthur H. Compton, chancellor of Washington University, at St. Louis, Missouri, and is an honorary member of the S.A.F.

←

Rutgers Establishes Demonstration Plot

Rutgers University has recently set aside a one-acre portion of the college woodland bordering a highly travelled state highway, to serve as a woodlot demonstration plot.

According to members of the Department of Forestry, the plot is readily accessible and can be seen easily from the road, and is therefore an ideal spot in which to show the results of plantings, pruning, thinning, and felling.

The stand was originally a fairly even-aged one consisting of mixed oaks with scattered beech, birch, and soft maple, and several red gum and yellow poplar. All malformed and defective trees were removed and the remaining trees were painted with a 5-inch band; green for those trees which will remain as the residual crop, and red for those to be removed in subsequent cuttings.

A cleared area adjacent to the plot was planted with white pine transplants.

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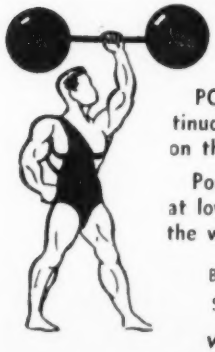

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Straight guides: 24 to 74 inches.

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Minn. Ag. Teachers Hold Short Course

Forty vocational agriculture instructors from northeastern Minnesota participated on July 13-15 in a farm forestry short course, the second of its kind for the area. The course was held at the University of Minnesota's Cloquet Forest Experiment Station under the direction of Dr. T. Shantz-Hansen, assisted by Joseph Ogrine, farm forestry instructor for the Iron Range Resources and Rehabilitation Commission, and George R. Cochran, state supervisor of vocational agriculture.

Forest inventory and management procedures were participated in by each of the teacher-students of the course, including actual pruning and forest improvement operations and the use of foresters' field tools, volume tables, and other technical aids.

From the course the participants received background for organizing forestry study in their vocational agriculture classes and for a projected revision of the *Minnesota Farm Planning Book* to include farm forestry subject matter.

U. of Fla. Graduates 26 From Ranger School

Twenty-six students graduated August 18 from the University of Florida State Forest Ranger School, one of two ranger schools in the U. S., after completion of a year's study.

Earl Porter, manager, Woodlands Department, Southern Kraft Division, International Paper Co., Mobile, a graduate of the New York Ranger School of the New York State College of Forestry, gave the major address at the graduation.

Mr. Porter was introduced by C. H. Coulter, Florida state forester, and the diplomas were presented by Dr. Wayne Reitz, Provost for Agriculture of the University of Florida.

Dunn Returns from Chile Assignment

Dean Paul M. Dunn, of the school of forestry at Oregon State College, returned after a year's forestry mission in Chile and took his first official action on July 29 when he participated in the initial meeting of the Oregon Forest Protection and Conservation committee. The committee was set up by the recent session of the legislature to administer forest research and the emergency fire fund.

Dean Dunn was on special assignment with the Food-Agricultural organization of the United Nations mission in Chile. While there he established a regular five-year forestry school at the University of Chile. He stated that two years are given over to agriculture and the remaining three years to technical forestry studies. It is a regular university or college course and includes two ten-week summer camps.

Ore. State Expands Range Management Program

Charles E. Poulton has returned to Oregon State College after two years of educational leave to resume his duties in charge of the Range Management program under the Departments of Animal Husbandry and Farm Crops. During this period Mr. Poulton completed the course work and residence requirements at the State College of Washington for the Ph.D. degree with a major in ecology and a minor in soils.

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SOCIETY OF AMERICAN FORESTERS
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During Mr. Poulton's absence, Dr. Donald W. Hedrick, a graduate in range management of the University of California and Texas A. & M. guided the Oregon State College Range Management program. Dr. Hedrick's background includes several years of experience as a range conservationist in the Soil Conservation Service as well as extensive ecological studies on brushlands in California. He is to continue as a colleague of Mr. Poulton in the range management work.

This expansion of staff will enable full development of the Oregon State College range management program. Both men will participate in research as well as teaching activities, each of which is jointly supported by the Departments of Animal Husbandry and Farm Crops.

The academic program includes a major in range management at undergraduate and graduate levels with numerous opportunities to build supporting minors in allied fields.

Industry

Nash-Kelvinator Announces Conservation Awards

Nash-Kelvinator Corporation has announced creation of an annual $5,000 awards program for professional contributions in the field of conservation of natural resources.

Ten cash awards of $500 each will be presented to ten professional conservationists, working in education, research, administration, or enforcement, in any field related to soil, water, forest, fish, or wildlife conservation.

In addition, ten awards consisting of plaques and citations will be given to non-professionals whose contributions to conservation have been performed as acts of good citizenship.

Richard C. Cranch Joins TECO Staff

Richard C. Cranch, a former research and development engineer with the U. S. Navy Bureau of Ships, has joined the laboratory staff of the Timber Engineering Co., Washington, D. C., where he will work on quality control for military and industrial wood products, improving the economies of laminating processes, and on preservative treating of wood.

His work with the Bureau of Ships was in the Navy's quality control program for marine laminated wood minesweepers and other marine craft.

Three Important New Books

- **VEGETATION AND WATERSHED MANAGEMENT**

E. A. COLMAN, *U. S. Forest Service*

A SYSTEMATIC appraisal of the opportunities and methods of watershed management. Book emphasizes the influence of vegetation on runoff, storage, floods, soil erosion, etc.; reviews research results with respect to changing the character of the vegetation in the interests of improved water supply and control. *37 ills., 6 maps.* $7

- **CONSERVATION LAW AND ADMINISTRATION**

A Case Study of Law and Resource Use in Pennsylvania

WILLIAM F. SCHULZ, JR., *University of Pittsburgh School of Law*

FIRST comprehensive study of a state's conservation laws and its program for the administration of renewable natural resources. Sponsored by *The Conservation Foundation*, the book covers wildlife, game, and fish; water management; forests; recreation; etc.; includes a *Model Conservation Administration Act* based on critical analysis of the law. *34 ills., 635 pp.* $10

- **IRRIGATION DEVELOPMENT AND PUBLIC WATER POLICY**

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NEW, comprehensive examination of economic and social aspects of irrigated agriculture and public water policy in the United States. Describes the planning, financing, organization, and operation of irrigation projects; investigates the requirements of sound, far-sighted irrigation policies on local, regional, and national levels. *20 ills., 320 pp.* $6.50

Other Books of Special Interest in Forestry

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ARTHUR B. RECKNAGEL, *St. Regis Paper Co.*
DONALD D. STEVENSON, *U. S. Dept. of Agriculture*

UP-TO-DATE information and guidance for successful forest management, in both planning and practice. Stressing applicability to American forests, book thoroughly covers problems of forest organization; principles and methods of forest regulation; and effects of economic conditions on forestry. Typical plans for various-sized forests throughout the U. S. *56 ills., 290 pp.* $6

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DETAILED analysis of modern forest mensuration, emphasizing more accurate ways of correlating aerial photographic and ground surveys with forest volume and growth. Covers essentials of all previous research, plus results of author's investigations. Comprehensive bibliography. *88 ills., 476 pp.* $8.50

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***also by* STEPHEN H. SPURR**

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Mr. Crauch is a graduate of the University of Maine and holds a master's degree in forestry from Yale University. He remained at Yale for over three years as supervisor of the testing laboratory. He has also been northeastern sales manager for Wood Treating Chemicals Co., St. Louis, Mo.

California Lumbermen Elect "Keep Green" Officers

Getting behind the Keep Green movement, California pine lumbermen elected officers and adopted by-laws to "Keep California Green" at a meeting July 31 in San Francisco.

K. M. MACDONALD

K. M. Macdonald was elected first president of "Keep California Green Inc." Macdonald is resident manager of the Sacramento Box and Lumber Co., Woodleaf. Harold Crane of Crane Mills, Inc., Corning, was named vice president, and David Fairbrother, of American Forests Products Corporation, San Francisco, became secretary-treasurer.

Directors present at the San Francisco meeting were Walter S. Johnson, American Forest Products Corp., San Francisco; Charles T. Gray, Stockton Box Co., Stockton; Robert Grimmett, Pine Logging Co., Fresno; George R. Duff, Cal-Ida Lumber Co., Auburn; A. B. Hood, Ralph L. Smith Lumber Co., Anderson; and Macdonald, Crane, and Fairbrother.

Also present was Carl Walker who was temporary chairman last year during the formative period of "Keep California Green." Walker, now with the Eureka Redwood Lumber Co., Eureka, resigned at this meeting.

Member Invites Correspondence.—Dr. J. Hugo Kraemer, with the United Nations Korean Reconstruction Agency, would like to hear from any Society members. Write him at APO 301, c/o Postmaster, San Francisco, Calif.

Burdett Green to Head Veneer Assn.

Executive changes in The Veneer Assn. and the Hardwood-Plywood Institute have resulted in the appointments of full-time heads for the two groups, in line with an expanded program for promoting hardwoods.

Burdett Green has been named executive vice president of The Veneer Assn., after resigning as secretary-manager of the American Walnut Manufacturers Assn.; and Charles E. Close, who has been both executive vice president of The Veneer Assn., and secretary-treasurer of the Hardwood-Plywood Institute will continue as secretary-treasurer of the H.P.I.

Charles H. White, who has been Green's assistant for seven years, succeeds him as secretary-manager of the A.W.M.A.

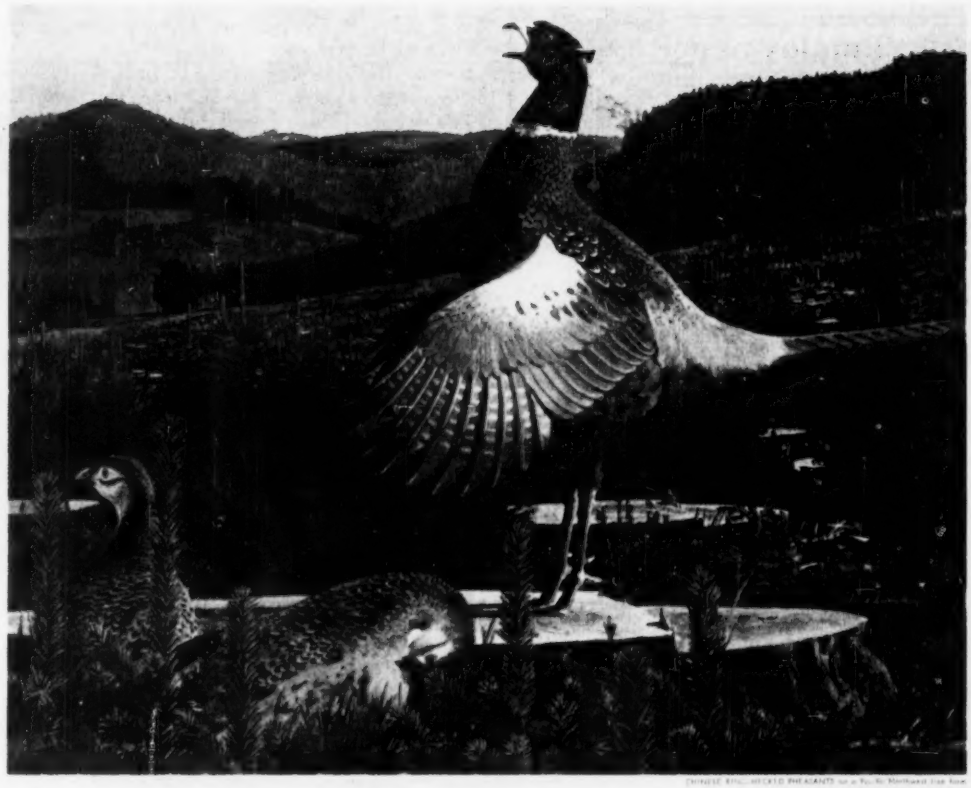
Amer. Pulpwood Assn. Reports on Pulpwood Use

Total receipts of pulpwood for the first four months of 1953 were 8,735,000 cords, a decline of nine percent under receipts for a comparable period last year, according to the American Pulpwood Association. Domestic receipts were 8,245,000 cords, a decline of 7 percent, and imports were 490,000 cords, a decline of 38 percent.

Declines in total receipts were registered in the Northeast region—31 percent; Appalachian region—4 percent; Lake States region—37 percent. Increases were reported in the South—3 percent; and in the Pacific Northwest—5 percent.

Pulpwood consumption for the same period was 9,090,000, a fraction under consumption for the comparable period in 1952. The South showed an increase of 5 percent, while in the other four regions, declines ranged from 1 percent in the Lake States to 9 percent in the Northeast.

Inventories at the end of April were 5,508,000 cords, a decline of 1 percent under those reported for the end of April last year. Regionally, however, inventory increases from a year ago were reported in the Northeast, South

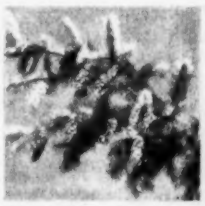


new tree crops replace the old on tree farms...

To meet America's needs for forest products both now and in the future, man and nature work together on privately owned forestlands to grow timber as a continuing crop. Trees harvested today to provide lumber for building, pulp for paper, and raw materials for other vital products are being replaced by new trees to help supply the generations ahead. This is being done through a voluntary system of industrial forest management known as tree farming.

On the Douglas fir tree farm illustrated above, young trees are thriving on open, sunlit ground which the tree farmer provided by clear-cutting selected blocks of timber. Several years ago, nature began growing the young forest from wind-scattered seeds. These seeds came from blocks of trees left standing by the industrial forester. The new forest will be protected from fire, insects and disease until harvested . . . in about 80 to 100 years.

Today, more than 4400 private owners operate about 28 million acres as tree farms in 35 states. All Weyerhaeuser Timber Company forestlands are managed as certified tree farms. *Write us at Box A, Tacoma, Washington for your free copy of our colorful booklet,* ***Tree Farming in the Pacific Northwest.***



Warm fall winds will open these Douglas fir cones, scattering their winged seeds on harvested lands to grow a new forest.

Modern processing enhances the beauty and utility of natural wood for interior paneling and in building today's homes.

Weyerhaeuser Timber Company

Wood is one of the nation's most valuable and versatile raw materials. People and industry use wood every day as lumber, pulp and paper, fibers, chemicals and in many other ways. To supply this market, our company is growing trees and manufacturing a variety of forest products.

National opinion surveys indicate that the public does not know about the progress being made in industrial forestry. Weyerhaeuser Timber Company is telling part of the story in a series of national magazine advertisements such as reproduced above. The Company believes that all who are engaged in industrial forest management should tell the facts about tree farming at every opportunity.

WORKING IN THE PACIFIC NORTHWEST TO CREATE A PERMANENT FOREST INDUSTRY

Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously, the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiations.

Forestry graduates in management, under 30 years of age, as staff assistants to district foresters.

Write Director, Texas Forest Service, College Station, Texas.

Positions Wanted

Graduate forester, 40, married, family, desires employment as forest estate manager or district forester for wood using industry. Seventeen years' experience in general forestry, tree planting, selective timber marking, cruising, evaluations, purchase and sale, fire protection and control, and forest management studies. Have worked for federal, state, and private industries. Presently self-employed as consulting forester. Information and references on request.
Box A, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, 36, with ten years of practical and executive experien e in the management of forest lands for sustained yield production of forest products. Interested in integrated utilization, development possibilities in land management, and forest administrative problems. Will serve anywhere in northern U. S. or Canada on a job offering challenge, opportunity, and a good salary.
Box B, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester now employed with a federal agency in the Northwest, pilot's license, seeks position anywhere in United States combining forestry with flying. Five years' experience in aerial mapping, timber management, road location, fire protection. Age 29, married.
Box C, Journal of Forestry, Mills Building, Washington 6, D. C.

Engineer-forester looking for job in northern New England with minimum of paper work. Especially interested recreational use and development. B.S. (Engineering) M.I.T.; B.S. (Forestry) Univ. Michigan; age 32, married.
Box D, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S.F., Pa. State, 1952. Age 23, single. Year's experience in photogrammetry. Increasing knowledge of photo-interpretation. Desires employment in private industry.
Box E, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S. and M.F. Twenty years experience U. S. Forest Service and industry. Specializing in logging engineering and sawmill operation; four years in forest products research and promotion of use of research results. Expert in hardwood timber quality and log grading. Desires employment with operating lumber company in logging, milling, or both.
Box F, Journal of Forestry, Mills Building, Washington 6, D. C.

and Pacific Northwest, ranging from 3 percent in the South to 16 percent in the Pacific Northwest. Declines of 12 percent and 13 percent, respectively, were reported in the Appalachian and Lake States regions.

Weyerhaeuser Experiments with Brush Killing Chemical

Weyerhaeuser Timber Co. is seeking to return thousands of acres of brush-infested land to productive forest through the application of weed killing chemicals by helicopter. These experiments are being carried out on the firm's Clemens tree farm near Elma, Wash.

Paul G. Lauterbach, Weyerhaeuser's research forester, described the helicopter spray project as a second phase of experiments in aerial brush control. Last year the company utilized a Stearman biplane in its experiments with various combinations of chemicals.

According to Lauterbach, the problem is to find an economical method of returning brush monopolized areas to conifer production. "Chemical formulations that will kill broadleafed brush varieties are an established fact. Our search is for a combination of chemicals and method of application that can be justified, on a dollars and cents basis, over a wide area," he said.

Forester, B.S.F. 1948 desires relocation offering opportunity for advancement. Five years experience commercial wood preserving company doing resear h and development. Familiar with all types preservatives and most treating methods. Member of A.W.P.A. 30 years old, married, two children.
Box G, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester desires permanent connection with industrial or organizational forestry department. Capable of developing and managing new work program. Has excellent relationship with private, state, and federal agencies through industrial and association work. Over 20 years experience in management, practical research, public relations, and administrative activities.
Box H, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, 28. B.S.F., M.F., married, two children. Two and one-half years experience in utilization including hardwood lumber inspection. Desires position in forest management or teaching. Graduate work in silviculture.
Box J, Journal of Forestry, Mills Building, Washington 6, D. C.

Graduate forester now directing conservation education camp program desires emp'oyment in public relations field with government or industry. Four years experience administration, exhibits, lecturing, writing. Married, age, 29.
Box K, Journal of Forestry, Mills Building, Washington 6, D. C.

Graduate forester, 37, married, two children; B.S.F. Michigan State, post-graduate work in secondary edu ation and short course in aerial photo interpretation, desires position in forestry or related field; prefers northern U.S. Physical handicap requires use of wheelchair indoors. Experience in private and public forestry includes forest nursery, cruising, fire control, land acquisition, management, public relations, administration, and research studies in Michigan, Idaho, and Massachusetts. Former position, chief forester with midwestern pulp mill, terminated by polio.
Box L, Journal of Forestry, Mills Building, Washington 6, D. C.

Sawmill manager and forester, 41, married, four children. B.S.F., desires position with wood-using industry in Northeast or Lake States. 13 years experience, timber management, logging, and supervising production of Northeastern sawmill and bobbin plant producing over two million feet hardwood lumber annually. Mill closing lack of orders.
Box Y, Journal of Forestry, Mills Building, Washington 6, D. C.

Graduate forester, 27, married and one child, desires employment with a wood using industry, preferably in Southeast. Pilot, presently on active duty with Air Force. Available on Oct. 1. Experience in fire control and timber management in Southeast. Information and references on request.
Box Z, Journal of Forestry, Mills Building, Washington 6, D. C.

Disston Runs Contest

Twelve chain saws and $2,000 in cash prizes are to be awarded in a contest to select the most appropriate names for two chain saws manufactured by Henry Disston & Sons, Inc., Philadelphia. There is no entry fee and nothing to buy. Contestants will find official entry blanks and rules at their Disston dealers or distributors.

A chain saw will be awarded to each of the six winners in each contest. In addition, there will be a first prize of $500 in each contest; a second prize of $250; a third prize of $150, and a fourth prize of $100. All entries must be mailed by October 31, and received in Philadelphia before November 15, 1953.

Oak Wilt Study Is Aided By Industry Grants

Private wood-dependent industries are financing grants totaling $45,000 to be distributed to colleges and universities for oak wilt research in 1953, according to an announcement by the National Oak Wilt Research Committee.

In announcing the grants, committee chairman S. M. Nickey, Jr., Nickey Bros., Inc., Memphis, said they have been recommended for Iowa State College, University of Missouri, Illinois Natural History Survey, University of Wisconsin, West Virginia University, and University of Minnesota. Coordinated programs also are being undertaken at the Ohio State Experiment Station and the University of Pennsylvania with funds from those states. The research is further coordinated with the activities of the Div. of Forest Pathology, U.S.D.A.

Society Affairs

Officers and Council

1952-1953

GEORGE L. DRAKE, *President*
Simpson Logging Company
Shelton, Wash.

ELWOOD L. DEMMON, *Vice President*
Southeastern Forest Experiment Station, Federal Building
Asheville, N. C.

HENRY CLEPPER, *Executive Secretary*
Mills Building, 17th Street at Pennsylvania Avenue, N. W.
Washington 6, D. C.

WILLIAM J. BROWN
Woodlands Department
Kimberly-Clark Corporation
Neenah, Wis.

C. OTTO LINDH
U. S. Forest Service
P. O. Box 1310
Albuquerque, N. M.

EARL PORTER
Southern Kraft Division
International Paper Company
Mobile 9, Ala.

D. B. DEMERITT
Dead River Company
6 State Street
Bangor, Me.

GORDON D. MARCKWORTH
College of Forestry
University of Washington
Seattle 5, Wash.

PERRY A. THOMPSON
Room 769, 681 Market Street
San Francisco, Calif

FRANK H. KAUFERT
School of Forestry
University of Minnesota
St. Paul 1, Minn.

RICHARD E. MCARDLE
Forest Service
U. S. Department of Agriculture
Washington 25, D. C.

RUTHFORD H. WESTVELD
Department of Forestry
University of Missouri
Columbia, Mo.

Staff

ARTHUR B. MEYER
Editor of Publications

L. AUDREY WARREN
Business Manager

LLOYD THORPE
Advertising Representative

Division Officers

1953

Division of Education

G. B. Hartman, chairman; Department of Forestry, Iowa State College, Ames, Iowa.
K. P. Davis, vice chairman; School of Natural Resources, University of Michigan, Ann Arbor, Mich.
A. E. Wackerman, secretary; School of Forestry, Duke University, Durham, N. C.

Division of Forest Economics and Policy

E. V. Zumwalt, chairman; Bureau of Land Management, U. S. Department of Interior, Anchorage, Alaska.
John Zivnuska, vice chairman; School of Forestry, University of California, Berkeley 4, Calif.
W. A. Duerr, secretary; New York State College of Forestry, Syracuse 10, N. Y.

Division of Forest Management

DeWitt Nelson, chairman; Department of Natural Resources, State Building #1, Sacramento 14, Calif.
Gordon D. Fox, vice chairman; U. S. Forest Service, Washington 25, D. C.
Stephen H. Spurr, secretary, School of Natural Resources, University of Michigan, Ann Arbor, Mich.

Division of Forest Products

Fred E. Dickinson, chairman; School of Natural Resources, University of Michigan, Ann Arbor, Mich.
R. C. Fraunberger, vice chairman; Atlas Plywood Corporation, Gladstone, Mich.
Lincoln A. Mueller, secretary; 2750 Exeter Drive, Tucson, Ariz.

Division of Forest Recreation

C. Frank Brockman, chairman; College of Forestry, University of Washington, Seattle 5, Wash.
Harthon L. Bill, vice chairman; P. O. Box 546, Yosemite National Park, Calif.
William N. Parke, secretary; U. S. Forest Service, Portland 8, Oreg.

Division of Forest-Wildlife Management

Ernest Swift, chairman; Wisconsin Conservation Commission, Madison, Wis.
J. V. K. Wagar, vice chairman; School of Forestry and Range Management, Colorado A & M College, Fort Collins, Colo.
Galen Pike, secretary; Box 338, Duluth, Minn.

Division of Private Forestry

E. F. Heacox, chairman; 810 North G Street, Tacoma, Wash.
Julian McGowin, vice chairman; W. T. Smith Lumber Company, Chapman, Ala.
N. T. Barron, secretary; Camp Manufacturing Company, Franklin, Va.

Division of Public Relations

Albert Arnst, chairman; Rt. 2, Box 126, Sumner, Wash.
Ralph Unger, vice chairman; College of Forestry, Syracuse 10, N. Y.
C. W. Mattison, secretary; U. S. Forest Service, Washington 25, D. C.

Division of Range Management

Raymond Price, chairman; Southwestern Forest and Range Experiment Station, Tucson, Ariz.
M. W. Talbot, vice chairman; California Forest and Range Experiment Station, Berkeley 1, Calif.
Grant A. Harris, secretary; Utah State Agricultural College, Logan, Utah.

Division of Silviculture

R. K. LeBarron, chairman, California Forest and Range Experiment Station, P. O. Box 245, Berkeley, Calif.
Philip A. Briegleb, vice chairman; Central States Forest and Range Experiment Station, 111 Old Federal Building, Columbus 15, Ohio
Jesse H. Buell, secretary; Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.
F. S. Baker, past chairman; School of Forestry, University of California, Berkeley, Calif.

Division of Watershed Management

H. G. Wilm, chairman; College of Forestry, State University of New York, Syracuse 10, N. Y.
Marvin D. Hoover, vice chairman; U. S. Forest Service, Box 257, Union, S. C.
Robert E. Dils, secretary-treasurer; Department of Forestry, Michigan State College, East Lansing, Mich.

Biennial Election

Fellows To Be Named By Electors on December 5

Eminent foresters who have been nominated by petition for advancement to the grade of Fellow will be considered by the electors during November. Successful nominees will be named at the time of the regular elections on December 5.

Selection is by an electoral board composed of present Council members and Fellows, and a favorable vote of half or more of the ballots cast is required for election.

At the time the October JOURNAL went to press, the following Members had been nominated for Fellow.

LeRoy D. Arnold, D. C.
H. O. Cook, Mass.
Charles S. R. Cowan, Wash.
William T. Cox, Minn.
George L. Drake, Wash.
Paul M. Dunn, Chile
Charles H. Flory, S. C.
George A. Garratt, Conn.
Verne L. Harper, Wash., D. C.
Willard R. Hine, Ga.
Leo A. Isaac, Ore.
Fred R. Johnson, Colo.
Frank H. Kaufert, Minn.
A. M. Koroleff, Canada
Edward I. Kotok, Chile
Earl W. Loveridge, D. C.
R. E. McArdle, D. C.
Perry H. Merrill, Vt.
Woodbridge Metcalf, Calif.
Elwood B. Moore, N. J.
Lee Muck, D. C.
R. R. Reynolds, Ark.
F. X. Schumacher, N. C.
T. Schantz-Hansen, Minn.
Earl W. Tinker, N. Y.
J. V. K. Wagar, Colo.
P. C. Wakeley, La.
George O. White, Mo.
Fred G. Wilson, Wis.

Members to Receive Ballots in October

Ballots for the regular biennial election will be sent to the 8,114 voting members of the Society during the latter part of October. These ballots will be counted on December 5 and the newly elected officers and council members will take office January 1, 1954 for the term 1954-1955.

Pictures and short biographies of the nominees are printed below. In former years the JOURNAL followed the practice of printing this information as nominations were received. However, this year we are printing them for the convenience of members in one issue, and have published monthly lists in Society Affairs as nominations were received.

Nominees For President

Walter J. Damtoft. Ass't Secretary and Treasurer, the Champion Paper and Fibre Co., Canton, N. C. Born Nov. 11, 1890, in Southport, Conn. Yale University, Sheffield Scientific School, Ph.B., 1910 (cum laude); M.F., 1911. S.A.F. Member, 1918.

Elwood L. Demmon. Director, Southeastern Forest Experiment Station, Asheville, N. C. Born Sept. 23, 1892 in Kendallville, Ind. University of Michigan, A.B., 1914; M.S.F., 1916. S.A.F. Member, 1925; Fellow, 1951.

DeWitt Nelson. Director, Dept. of Natural Resources, Sacramento, Calif. Born Jan. 13, 1901 in Madrid, Iowa. Iowa State College, B.S. in Forestry, 1925. S.A.F. member, 1926.

Gordon D. Marckworth. Dean, College of Forestry, University of Washington, Seattle. Born Jan. 31, 1895 in Cincinnati. Ohio State University, B.S., 1916; Yale University, M.F., 1917. S.A.F. Member, 1927.

Nominees For Member of the Council

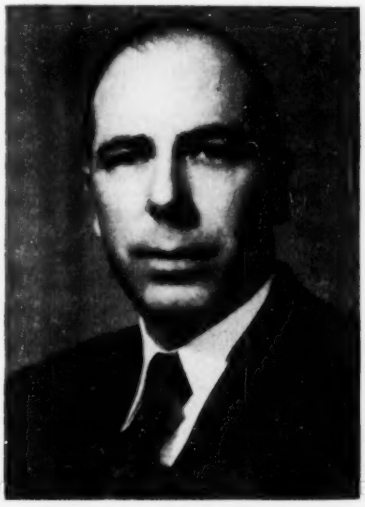
William J. Brown. Ass't Chief Forester, Kimberly-Clark Corp., Neenah, Wis. Born May 12, 1905 in Vancouver, Wash. Montana State University, B.S. in Forestry, 1931. S.A.F. Jr. member, 1936; Member, 1945.

C. Huxley Coulter. State Forester, Florida Forest Service, Tallahassee, Fla. Born June 26, 1903 in Windsor, Ont. University of Michigan, B.S. in Forestry, 1929. S.A.F. Jr. member, 1931; Member, 1945.

Dwight B. Demeritt. Manager of Woodlands, Dead River Co., Bangor, Me. Born Aug. 13, 1898 in Sangerville, Me. University of Maine, B.S., 1922; Yale University, M.F., 1923. S.A.F. Jr. member, 1924; Member, 1929.

Stanley G. Fontanna. Dean, School of Natural Resources, University of Michigan. Born Feb. 5, 1895 in Powers, Mich. University of Michigan, B.S. in Forestry, 1917. S.A.F. Jr. member, 1935; Member, 1938.

William C. Hammerle. Forester, Southern Pine Assn., New Orleans. Born Aug. 17, 1903 in Syracuse, N. Y. New York State College of Forestry, B.S., 1925. S.A.F. Jr. member, 1929; Member, 1936.



Percy D. Hanson. Regional Forester, U. S. Forest Service, Missoula, Mont. Born Sept. 1, 1901 in St. Andrews, New Brunswick, Canada. University of California, B.S., 1925. S.A.F. Jr. member, 1926; Member, 1933.

Verne L. Harper. Ass't. Chief, U. S. Forest Service, Washington. Born Aug. 13, 1902 in Monroe, S. D. University of California, B.S., 1926; M.S., 1927; Duke University, Ph. D., 1943. S.A.F. Jr. member, 1927; Member, 1932.

Edwin F. Heacox. Managing Forester, Weyerhaeuser Timber Co., Tacoma, Wash. Born June 5, 1906 in Britt, Iowa. Iowa State College, B.S.F., 1930. S.A.F. Jr. member, 1937; Member, 1944.

D. E. Hess. Ass't Manager, Glatfelter Pulpwood Co., Gettysburg, Pa. Born Feb. 24, 1912 in Ephrata, Pa. Pennsylvania State College, B.S. in Forestry, 1935. S.A.F. Jr. member, 1936; Member, 1941.

R. Vance Miles, Jr. Manager, Division of Forestry, Gulf States Paper Corp., Tuscaloosa, Ala. Born May 24, 1911 in Opelousas, La. Louisiana State University, B.S.F., 1933. S.A.F. Jr. member, 1935; Member, 1943.

Galen W. Pike, Forest Supervisor, U. S. Forest Service, Duluth, Minn. Born May 29, 1902 in Brentwood, N. H. University of Idaho, B.S., 1927; Yale University, M.F., 1928. S.A.F. Jr. member, 1929; Member, 1938.

Carl A. Rishell. Dir. of Research, National Lumber Mfrs. Assn., and Timber Engineering Co., Washington. Born Feb. 27, 1898 in Emporium, Pa. Pennsylvania State College, B.S. in Forestry, 1923. S.A.F. Jr. member, 1936; Member, 1936.

J. Nelson Spaeth. Head, Dept. of Forestry, University of Illinois, Urbana. Born Nov. 10, 1896 in Rochester, N. Y. Cornell University, B.S., 1919; Harvard University, M.F., 1920; Yale University, Ph.D., 1933. S.A.F. Jr. member, 1922; Member, 1925.

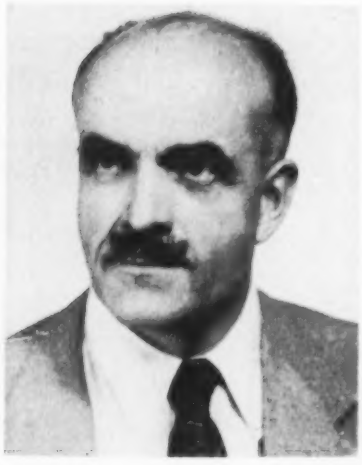
John W. Squires. Head, Forestry Dept., Mississippi Forest Prod., Inc., Jackson, Miss., Born April 14, 1906 in Grandin, Mo. Louisiana State University, B.S.F., 1932. S.A.F. Jr. member, 1934; Member, 1946.

Terrill D. Stevens. Head, Dept. of Forestry, Michigan State College, East Lansing. Born March 27, 1903 in Los Angeles, Calif. Montana State University, B.S.F., 1936; Yale University, Ph.D., 1940. S.A.F. Jr. member, 1938; Member, 1944.

J. Herbert Stone. Regional Forester, U. S. Forest Service, Portland, Ore. Born Aug. 28, 1904 in New Haven, Conn. Yale University, B.S., 1926; M.F., 1927. S.A.F. Jr. member, 1928; Member, 1934.

Charles L. Tebbe. Regional Forester U. S. Forest Service, Philadelphia. Born Jan. 24, 1908 in Weed, Calif. University of California, B.S.F., 1929. S.A.F. Jr. member, 1935; Member, 1936.

Perry A. Thompson. Secretary-Manager, Western Lumber Mfr., Inc., San Francisco. Born Feb. 3, 1889 in Conconully, Wash. Attended State College of Washington. Jr. member, 1937; Member, 1940.



John V. K. Wagar. Head, Dept. of Forest Recreation and Game Management, Colorado A & M College, Fort Collins. Born Oct. 19, 1898 in Dover, Ohio. University of Michigan, B.S.F., 1920; M.S.F., 1923. S.A.F. Jr. member, 1924; Member, 1930.

Ruthford H. Westveld. Chairman, Forestry Dept., University of Missouri, Columbia. Born March 18, 1900 in Grand Rapids, Mich. Michigan State College, B.S.F., 1922; Yale University, M.F., 1925; Michigan State College, Ph.D., 1946. S.A.F. Jr. member, 1924; Member, 1929.

Erwin G. Wiesehuegel. Chief of Forestry Investigations Branch, Forestry Relations Div., T.V.A., Norris, Tenn. Born May 27, 1899 in LaCrosse, Wis. University of Michigan, B.S. in Forestry, 1922; University of Idaho, M.S., in Forestry, 1929. S.A.F. Jr. member, 1927; Member, 1933.

How to Vote Effectively in 1953 S.A.F. Election

The 1953 elections will mark the 13th anniversary of the Hare System of Proportional Representation ("PR") in Society biennial elections. This method was adopted in 1929 and has been in use ever since.

The Hare System has consistently met the test of efficiency and fairness wherever it has been applied. Many municipalities and private associations have found it the soundest means of electing officers and directors most representative of their voting groups. Briefly, this scientifically devised system (1) provides representation to minority groups, (2) assures majority rule to an extent far superior to that possible by any other system of election, and (3) permits each voter (or member in good standing) to vote for the candidates he really wants, whether or not he thinks they are likely to be elected.

The only basic requirement which voters have to meet is to mark their ballots properly. This is simplicity itself. All the voter need do is to mark number *1* opposite the name of his first choice candidate, number *2* opposite the second choice, and so on *all the way down the entire list of candidates*. Thus the completely effective ballot would be one that provided a different "rating" for each candidate listed (no duplicating numbers) irrespective of the number of positions to be filled. In the case of S.A.F. elections this procedure applies equally to the respective ballots for Council, and for President (and Vice President). It prevents the wasting of votes and gives effect to every vote to which it is possible to give effect.

There are excellent reasons for this procedure, as the following brief description brings out.

When the Society's Teller Committee receives the ballots, they are tabulated initially by first choice votes. Any ballot which fails to show a clear first choice—i.e., exhibits duplicate numbers, check marks, or X's—is thrown out as invalid. (In the 1947 election 3 percent of the ballots were invalid for this reason; and in 1949, about 4 percent; in 1951, however, only 0.8 percent were invalid.)

Candidates who receive enough first choice votes to meet the quota (total number of valid ballots divided by one plus the number of positions to be filled, plus one) are immediately declared elected, and their surplus votes are transferred to the voters' second choice candidates. Similarly, the candidate receiving the fewest first choice votes is declared defeated, and his ballots transferred to the voters' respective second choice candidates. This process continues via a series of transfers until all candidates are declared either defeated or elected.

The importance of marking the ballots in full is illustrated by the 1951 election in which 12 separate transfers were required to elect the nine Council members, and 3 transfers to elect the President and Vice President. Over 36 percent of the ballots for Council had to be eliminated from the later transfers because the voters concerned had failed to indicate enough choices beyond the nine to be elected. Had every voter listed a number for each of the 20 candidates for these nine positions, every candidate would have been assured of equal consideration until either defeated or elected.

The 1951 election was unique in that for the first time the ballots were tabulated by hand instead of by machine. Thirteen people took part in the sorting and counting, thereby gaining a

first-hand knowledge of how "PR" works. So far as these participants are concerned, the Society can feel assured that all of them will mark their ballots effectively!

Those who wish further details of how the system works can consult the article "The Hare System of Proportional Representation and How it Works" in the September 1951 issue of the JOURNAL OF FORESTRY.

BERNARD FRANK,
Chairman, Teller Committee, S.A.F.

Allegheny Section Summer Meeting

The annual summer meeting of the Allegheny Section was held August 7 and 8 at the Blue Jay Forestry Camp of the Pennsylvania State College, near Marienville, in the Allegheny National Forest. Attendance during the meeting totalled 150.

At an indoor session, Chairman Adna R. Bond greeted the members, and thanked the college for making it possible to hold the meeting. Henry Clepper discussed briefly Society membership and financial problems. A history of the area was given by Professors M. K. Goddard and Ronald A. Bartoo.

Three half-day field trips were taken to interesting forestry operations in the vicinity. The first, under the leadership of Arthur L. Bennett, was to the Wilcox operating unit of the Armstrong Forest Company. This company, whose president is E. O. Ehrhart, has managed hardwood timberland for pulpwood and timber production for nearly 50 years, and has employed foresters nearly as long.

A second half-day trip was made to portions of the Allegheny National Forest where integrated forest and wildlife management areas were visited. This portion of the trip was under the supervision of Supervisor R. J. Costley and District Ranger A. C. Van Nort.

A stop was made at one of the roadside recreational areas maintained by the Pennsylvania Department of Highways. Chief Forester Wesley L. Hottenstein explained the department's policy in developing such facilities.

The third and final field trip was made to Cook Forest Park, maintained by the Pennsylvania Department of Forests and Waters. Regional Forester Merritt J. Harding and Park Forester Harold S. Streater led the members on a tour through the old-growth timber. The visiting foresters were impressed by the manner in which dead and dying trees that had to be removed for safety or sanitation purposes were taken out without impairment of the natural values that the park is intended to preserve.

February 25 and 26 are the dates for the Section's winter meeting in Baltimore.

Inland Empire Section Field Meeting

Approximately 75 members of the Inland Empire Section braved snow and mud on May 23 to view field demonstrations of Engelmann spruce forest management problems on the St. Joe National Forest near Avery, Idaho. After spending the night at Avery Station, the group was picked up early on the morning of the 23rd and hauled by trucks to Camp 44 of the Potlatch Forests, Inc., for a logging camp breakfast as guests of the company. During the ride the group viewed the Fishhook Creek timber access road recently completed by the Forest Service. The road is outstanding for its engineering features which include a 350-foot solid rock tunnel.

After breakfast and an examination of the P.F.I. camp, operation of the Forest Service Roundtop working circle was discussed. In the field, problems in winter logging and log road construction were demonstrated and the current Engelmann spruce beetle epidemic was examined and described. Following lunch at Camp 44, the group was taken into the current P.F.I. logging operations on the national forest. These operations were devoted during the 1952-53 winter almost entirely to the salvage of spruce timber attacked and killed by the spruce beetle in June and July of 1952. A prescribed broadcast slash burning experiment conducted cooperatively by the St. Joe National Forest and the P.F.I. company in 1952 was also visited.

Section Chairman Charles A. Wellner announced the election of the new Section officers. These included Philip C. Johnson, Coeur d'Alene, Idaho, chairman; Richard Bingham, Spokane, Washington, vice-chairman; and John O. Herron, Coeur d'Alene, secretary-treasurer.

Before adjourning, the Section extended its best wishes and a vote of appreciation to Dean D. S. Jeffers upon the occasion of his retirement as head of the University of Idaho School of Forestry.

Section Manuals

Early in 1950 Section Manuals were prepared and sent to Society and Section officers, Council members, Chapter chairmen, and Section representatives at accredited schools of forestry. It is assumed that officers have passed these manuals on to their successors. If not and copies are needed they may be obtained upon request from the Society office; also to replace lost or worn manuals.

Deadline Near for Consultant Listing

Consulting foresters who wish to have their names included in the Society's January 1954 List of Consulting Foresters should apply to the Society office prior to November 1, 1953.

Consultants applying for listing should provide name, address, territory, and specializations, following the form used in the last list which was published in the January 1953 JOURNAL OF FORESTRY.

Consultants whose listings appeared in the previous compilation and who have not yet returned inquiry cards mailed to them in September should do so at once.

Announcement of Applicants

Applicants for admission, advancement, or reinstatement whose membership applications were received in the Society office during the month of August are listed below.

Action regarding the eligibility of these applicants will be taken by the Council as of November 1, 1953. Any communications from voting members relating to the membership eligibility of any of these applicants should be received in the Society office prior to that date.

Correction

In the August issue of the JOURNAL OF FORESTRY, page 599, there appeared the names of fifteen Student Members eligible for automatic advancement.

Through an error, these students were listed as Student Members at the University of Minnesota in the Upper Mississippi Valley Section. Actually, they were Student Members of Iowa State College.

The JOURNAL regrets this error.

Allegheny Section

Junior Grade

Sallack, E. L., Dist. Forester, Hammermill Paper Co., Erie, Pa.; Pa. State, B.S.F., 1950.

Appalachian Section

Junior Grade

Mitchell, W. P., Farm Forester, N. C. Dept. of Cons. and Dev., Fayetteville, N. C.; N. C. State, B.S.F., 1951.

Member Grade

Davis, W. G., Pres., Davis and Adams Lbr. Co., Bryson City, N. C.; N. C. State, B.S.F., 1937 (Junior, 1946).

Griffin, R. H., Grad. Stud., Duke Univ., School of Forestry, Durham, N. C.; V.P.I., B.S. (Forestry), 1943; Yale Univ., M.F., 1947. (Junior, 1947).

Pippin, J. A., Dist. Forester, N. C. Dept. of Cons. and Dev., Rockingham, N. C.; N. C. State, B.S.F., 1935. (Junior, 1946).

Gulf States Section

Student Grade

MICHIGAN STATE COLLEGE

Martin, J. L. Sedlock, E. J.

Junior Grade

Young, R. W., 2556 Ardwell Ave., Akron, Ohio; State Univ. of N. Y., B.S.F., 1953. (Student, 1953).

Member Grade

Eriksson, N. L., On military leave from S.C.S., Lansing, Mich.; Univ. of Conn., B.S. (Forestry), 1935. (Junior, 1936).

Columbia River Section

Junior Grade

Berkshire, J. A. K., Logging Engr., Bur. of Land Mgmt., Roseburg, Ore.; Univ. of Wash., B.S.F., 1951.

Cowan, W. A., Field Forester, U.S.D.I., Coos Bay Forest Dist., Coos Bay, Ore.; State Univ. of N. Y., B.S.F., 1952.

Skillman, W. C., U.S.F.S., Prineville, Ore.; State Univ. of N. Y.; B.S.F., 1953 (Student, 1953).

Member Grade

Cliff, O., Forester, Ochoco Natl. Forest, Prineville, Ore.; Utah State Agric. College, B.S.F., 1938. (Junior, 1945).

Langdon, J. P., Dist. Rgr., U.S.F.S., Zigzag, Ore.; Oregon State, B.S., (L. A.), 1932. (Junior, 1946).

Central States Section

Junior Grade

Boatman, J. H., Forester and Procurement Agent, Newport Industries, Inc., DeQuincy, La.; L.P.I., B.S., (Forestry), 1949. (Affiliate, 1951).

Dance, J. E., Dist. Forester, Latcher and Moore Lbr. Co., Orange, Texas; L.P.I., B.S. (Forestry), 1951. (Affiliate, 1951).

Dickerson, H. C., Consultant, Lone Star Creosoting, Longview, Texas; L.P.I., B.S., (Forestry), 1951. (Affiliate, 1951).

McDonald, F. O., Asst. Dist. Forester, Nebo Oil Co., Inc., Goodpine, La.; L.P.I., B.S. (Forestry), 1950. (Affiliate, 1951).

Miesch, J. R., Dist. Forester, Southwestern Settlement and Dev. Corp., Kirbyville, Texas; L.P.I., B.S., (Forestry), 1951. (Affiliate, 1951).

Member Grade

Franklin, C. R., Forester, Wirt Davis Estate, Livingston, Texas; Univ. of Georgia, B.S.F., 1939, (Junior, 40R49).

Affiliate Grade

Gauldin, W. T., 3400 Lillian St., Shreveport, La.; L.P.I., B.S., (Forestry), 1953.

Heath, B. J., Tbr. Buyer, R. W. Van Zandt, Kinder, La.; Oklahoma A & M., B.S., (Forestry), 1950.

Russell, E. P., Jr., 114 Stone Ave., Monroe, La.; L.P.I., B.S., (Forestry), 1953.

Smith, J. R., Bernice, La.; L.P.I., B.S. (Forestry), 1953.

Sutton, W. T., Box 32, Haynesville, La.; L.P.I., (Forestry), 1953.

Kentucky-Tennessee Section

Junior Grade

Haskins, N. H., Forester, Div. of Forestry Relations, T.V.A., Paris, Tenn.; L.P.I., B.S., (Forestry), 1950. (Affiliate, 1951).

New England Section

Student Grade

UNIVERSITY OF MASSACHUSETTS

Gatchell, C. J.

Junior Grade

Fresvert, R. W., 332 Hill St., Waterbury, Conn.; State Univ. of N. Y., B.S.F., 1953. (Student, 1952).

Howard, L. R., Kent, Conn.; W. Va. Univ., B.S.F., 1953. (Student, 1953).

Kizyma, B. J., 6 Scranton St., New Haven, Conn.; Ukrainian Tech. Inst., (Forest Engr.), 1948; Yale Univ., M.S.F., 1952.

Zaremba, J., Instructor, School of Forestry, Yale Univ., New Haven, Conn.; Univ. of Wash., B.S.F., 1948; State Univ. of N. Y., M.F., 1951.

Member Grade

Dussault, W. E., County Forester, New Hampshire Ext. Service, Keene, N. H.; Univ. of N. H., B.S., (Forestry), 1937. (Junior, 1947).

Affiliate Grade

Brennan, R. S., 631 King St., Bristol, Conn.; Univ. of Conn., B.S., (Forestry), 1953.

Carlson, L. E., 188 Plainville Rd., Unionville, Conn.; Univ. of Conn., B.S., (Forestry), 1953.

New York Section

Junior Grade

Galvin, B. J., 63 Brayton Rd., Rochester, N. Y.; State Univ. of N. Y., B.S.F., 1952. (Student, 1952).

Timmerstedt, J. P., 11 Elliot Ave., Jamestown, N. Y.; State Univ. of N. Y., B.S.F., 1953. (Student, 1953).

Wells, O. O., Shelter Island, N. Y.; State Univ. of N. Y., B.S.F., 1953. (Student, 1953).

Member Grade

Dean, H. J., Aquatic Biologist, N. Y. S. Cons. Dept., Rome, N. Y.; State Univ. of N. Y., B.S.F., 1942. (Junior, 1946).

Affiliate Grade

Little, R., Field Surv., Osmose Wood Pres. Co. of America, Buffalo, N. Y.; Univ. of Conn., B.S., (Forestry), 1951.

Wilson, M. R., Resident Mgr., Canadian Int. Paper Co., Montreal, Canada; Univ. of Toronto, B.S., (Forestry), 1934.

Northern California Section

Affiliate Grade

Stahl, V. E., Asst. Forest Rgr., Calif. Div. of Forestry, Sutter Creek, Calif.

Ozark Section

Junior Grade

Patton, E. N., Dist. Forester, Dierks Lbr. and Coal Co., Onyx, Ark.; L.P.I., B.S., (Forestry), 1951. (Affiliate, 1951).

Tyson, R. L., Asst. Dist. Forester, Dierks Lbr. and Coal Co., Winthrop, Ark.; L.P.I., B.S. (Forestry), 1951. (Affiliate, 1951).

Member Grade

Crosby, J. S., U.S.F.S., Salem, Mo.; Univ. of Mich., B.S.F., 1934. (Junior, 1946).

Kihlmire, P. M., Forest Rgr., U.S.F.S., Poplar Bluff, Mo.; Cornell Univ., B.S.F., 1934. Reinstatement.

Welch, J. J., Mgmt. Asst., U.S.F.S., Hot Springs, Ark.; Cornell Univ., B.S.F., 1932. (Junior, 34R50).

Affiliate Grade

Gandy, W. V., Field Mgr., Pomeroy and McGowin, Monticello, Ark.; A.P.I., (1 yr.).

Puget Sound Section

Affiliate Grade

Brooks, O. E., Forestry Aide, U. S. Indian Service, Neah Bay, Wash.

Fieldhouse, T., Forestry Aide, Bur. of Land Mgmt., Anchorage, Alaska; State College of Wash., B.S., (Forestry), 1950.

Southeastern Section

Junior Grade

Monk, M. D., C.F.M., Forester, State of Alabama, Ozark, Ala.; A.P.I., B.S.F., 1950.

Member Grade

Albin, J. R., Dist. Forester, Coosa River Newsprint Co., Childersburg, Ala.; Univ. of Ga., B.S.F., 1938. (Junior, 41R48).

Bradshaw, D. E., Sec., Forest Mgrs., Inc., Jacksonville Beach, Fla.; Univ. of Mich., B.S.F., 1930. (Junior, 1943).

Hall, E. A., Forester, Container Corp. of America, Fernandina, Fla. (Junior, 1944).

Hutchins, J. P., Dist. Forest Rgr., Conecuh Natl. Forest, Andalusia, Ala.; State Univ. of N. Y., B.S.F., 1943. (Junior, 1946).

Kalmar, L. F., Forester, Gair Woodland Corp., Jasper, Fla.; West Va. Univ., B.S.F., 1942. (Junior, 1946).

Southwestern Section

Member Grade

Felker, R. H., Forester, U.S.D.A., Albuquerque, N. Mex.; Iowa State, B.S.F., 1936; M.F., 1938. Reinstatement.

Affiliate Grade

Peters, J., Forestry Aide, U.S.F.S., Sitgreaves Natl. Forest, Holbrook, Ariz.; Okla. A & M., B.S., (Forestry), 1952.

Upper Mississippi Valley Section

Affiliate Grade

Lee, H. A., Dist. Rgr., Minn. Forest Service, Cass Lake, Minn.

Nelson, E. H., Pulpwood Buyer, Northwest Paper Co., Cloquet, Minn.

Wisconsin-Upper Michigan Section

Junior Grade

Ahonen, R. R., Vice Pres., Ahonen Lbr. Co., Ironwood, Mich.; Univ. of Mich., B.S.F., 1949.

Eggen, C. T., Forester, Menominee Indian Mills, Neopit, Wis.; Univ. of Minn., B.S.F., 1940.

Sliker, A., Tech., Forest Products Lab., Madison, Wis.; Duke Univ., B.S., (Pre-forestry), 1951; M.F., 1952.

No Section

Affiliate Grade

Lanier, J. W., III, USS Tripoli, CVE 64, c/o F.P.O., N. Y., N. Y.; Univ. of Ga., B.S.F., 1950. Reinstatement.

Affiliate Grade

Feinbaum, M., Cartographer, c/o Inter-American Geodetic Survey, Balboa Heights, Canal Zone; Mont. State, B.S., (Forestry-Wildlife), 1951.

PART of a window display to appear in approximately 3,000 GMC truck dealerships as part of a project sponsored by the Truck and Coach Division of the General Motors Corporation to promote safety on the highways and in the woods.

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Arnold, Md.
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3. West Virginia

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2-3-53

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6-1-53

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7-1-53

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2. Central Oregon
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4. Longview
5. Portland
6. Shasta-Cascade
7. Siskiyou
8. Umpqua-Coquille
9. Willamette

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5-25-53

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Fernan Ranger Station, Coeur d'Alene, Idaho

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10-6-52

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Chapters: None

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2-23-52

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1-24-52

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2. Black River Valley
3. Capital District
4. Iroquois
5. Longhouse
6. Metropolitan
7. Mid-Hudson
8. Ontario
9. Upper Hudson
10. Western New York

Northern California Section
6-1-53

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California Forest and Range Experiment Station, P. O. Box 245, Berkeley 1, Calif.
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California Forest and Range Experiment Station, P. O. Box 245, Berkeley 1, Calif.

Chapters: 1. Bay Area
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3. Feather River
4. Lassen-Almanor Forum
5. North Coast Forest Forum
6. Redding
7. Sacramento
8. San Joaquin

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5-1-53

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Northern Rocky Mountain Forest and Range Experiment Station, Federal Building, Missoula, Mont.
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125 Sentinel Avenue, Missoula, Mont.

Chapters: None

Ozark Section
1-23-53

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Department of Forestry, University of Missouri, Columbia, Mo.
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Planning and Resources Board, Capitol

Building, Oklahoma City 5, Okla.
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Department of Forestry, University of Missouri, Columbia, Mo.
C. L. Clymer, Membership Chairman
Box 474, Antlers, Okla.

Chapters: None

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10-2-53

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3229 Aiki Avenue, Seattle 6, Wash.
William H. Larson, Vice Chairman
949 Henry Bldg., Seattle 1, Wash.
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Anderson Hall, University of Washington, Seattle 5, Wash.
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2252 Ottawa St., West Vancouver, B. C. Canada

Chapters: 1. Alaska
2. British Columbia
3. North Olympic
4. Southwest Washington

Southeastern Section

2-6-53

Archie Patterson, Chairman
School of Forestry, University of Georgia, Athens, Ga.
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Jack T. May, Secretary-Treasurer
Alabama Polytechnic Institute, Auburn, Ala.
Archie Patterson, Membership Chairman
School of Forestry, University of Georgia, Athens, Ga.

Chapters: 1. Alabama
2. Florida
3. Georgia

Southwestern Section

7-1-53

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Douglas C. Morrison, Secretary-Treasurer
Box 532, Winslow, Ariz.
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P. O. Box 1310, Albuquerque, New Mexico

Chapters: None

Southern California Section

7-26-52

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Kerckhoff Laboratories of Biology California Institute of Technology, Pasadena 4, Calif.
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2425 Brigden Road, Pasadena 7, Calif.
Russell A. Ireland, Secretary-Treasurer
167 E. Bonita Avenue, San Dimas, Calif.
Robert J. Ball, Membership Chairman
2425 Brigden Road, Pasadena 7, Calif.

Chapters: None

Upper Mississippi Valley Section

11-1-52

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School of Forestry, University Farm, St. Paul, Minn.
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Lake States Forest Experiment Station, Grand Rapids, Minn.
J. Donald Meyers, Membership Chairman
Minnesota Forest Service, Willow River, Minn.

Chapters: 1. Iowa
2. Lake Superior
3. North Dakota
4. Northwest Minnesota
5. Southern Minnesota

Washington Section

5-21-53

C. M. Genaux, Chairman
5236 Fillmore Avenue, Alexandria, Va.
E. A. Hanson, Vice Chairman
U. S. Forest Service, Washington 25, D. C.
V. A. Tribbett, Secretary-Treasurer
Room 5557, Interior Bldg., Washington 25, D. C.
Arthur A. Davis, Membership Chairman
819 Gist Avenue, Silver Spring, Md.

Chapters: None

Wisconsin-Upper Michigan Section

2-20-53

Allan S. Haukom, Chairman
Sauk City, Wis.
E. W. Fobes, Secretary-Treasurer
Forest Products Laboratory, Madison, Wis.

Chapters: 1. Hiawatha
2. Madison
3. Milwaukee
4. Northeastern Wisconsin

International Botany Congress Will Meet in Paris in 1954

A special invitation to attend the eighth International Congress of Botany which will be held in Paris, July 2 to 14, 1954, has been extended to members of the S.A.F. by the secretary of the Congress. The meeting will coincide with the 100th anniversary of the Botanical Society of France, and various members of the International Union of Biological Sciences will also meet during the Congress.

In addition to meetings, there will be excursions to the Hyères Islands, the Corsican Mountains, Senegal and the confines of the Sahara, and the forests and mountains of the Ivory Coast and French Guinea. Sightseeing tours in the vicinity of Paris are also being organized.

English and French will be the official languages for the meeting, and all papers and reports presented during the Congress will be published in those languages.

S.A.F. members who wish complete information about the Congress should write to the Secretary-General, C.N.A.M., 292 Rue Saint-Martin, Paris. A deadline of January 15, 1954, has been set for the submission of papers to be presented at the sessions.

Society Committees and Representatives
1953

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Myron Krueger, chairman; School of Forestry, University of California, Berkeley 4, Calif.
P. M. Dunn
Paul A. Herbert
Walter H. Meyer
R. J. Preston

Committee on Civil Service

M. K. Goddard, chairman; Department of Forestry, Pennsylvania State College, State College, Pa.
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G. S. McIntire
J. W. Myers, Jr.
Harris A. Reynolds
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Julius Kahn
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Committee on Forest Types

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Daniel DenUyl
R. C. Hawley
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Paul Schoen
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Bruce Stewart
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Roland Rotty

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Robert W. Hess
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Program

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W. G. McGinnies
H. R. Woodward
David H. Canfield
T. J. Fillas

Arrangements

Raymond E. Phillips, chairman; U. S. Forest Service, P. O. Box 1066, Colorado Springs, Colo.
Jacob Roeser
Everett Lee
C. H. Wasser
R. B. McKennan

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E. J. Eliason
Harold E. Engstrom
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D. B. Demeritt
C. Otto Lindh

Joint Committee on Fire Control Equipment with American Society of Mechanical Engineers

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Charles S. Cowan (W. D. Hagenstein, alternate)
W. E. McCraw
Gilbert I. Stewart

Representatives to the Logging and Sawmill Safety Code Committee, National Bureau of Standards

E. T. Clark, Pacific Northwest Loggers Association, White-Henry-Stuart Building, Seattle 1, Wash.
Seth Jackson, U. S. Forest Service, Washington 25, D. C.

Representative to the National Recreation Policies Committee

Shirley W. Allen, School of Natural Resources, University of Michigan, Ann Arbor, Mich.

Representative to the Committee on Inter-Society Relations of American Geophysical Union

Harold G. Wilm, College of Forestry, State University of New York, Syracuse 10, N. Y.

Representative to Division of Biology and Agriculture, National Research Council

E. L. Demmon, Southeastern Forest Experiment Station, Federal Building, Asheville, N. C.

Representative to National Committee on Policies in Conservation Education

John F. Lewis, 315 Hickory Street, California, Pa.

Representatives to the Council of the American Association for the Advancement of Science (Section 0), Agriculture

Robert P. Holdsworth, Forestry Department, University of Massachusetts, Amherst, Mass.
Stephen N. Wyckoff, California Forest and Range Experiment Station, P. O. Box 245, Berkeley 1, Calif.

Representative to Natural Resources Council of America

Henry Clepper

Representative to American Institute of Biological Sciences

Henry Clepper

Colleges and Universities in the United States Offering Instruction in Forestry

SEPTEMBER 1, 1953

Accredited

The following institutions are accredited for forestry instruction by the Council of the Society of American Foresters.

Alabama Polytechnic Institute, Department of Forestry, Auburn, Ala.

University of California, School of Forestry, Berkeley 4, Calif.

Colorado A & M College, School of Forestry and Range Management, Fort Collins, Colo.

Duke University, School of Forestry, Durham, N. C.

University of Florida, School of Forestry, Gainesville, Fla.

University of Georgia, School of Forestry, Athens, Ga.

University of Idaho, College of Forestry, Moscow, Idaho.

Iowa State College, Department of Forestry, Ames, Iowa.

Louisiana State University, School of Forestry, Baton Rouge 3, La.

University of Maine, Department of Forestry, Orono, Maine.

University of Massachusetts, Department of Forestry and Wildlife Management, Amherst, Mass.

Michigan State College, Department of Forestry, East Lansing, Mich.

University of Michigan, Department of Forestry, Ann Arbor, Mich.

University of Minnesota, School of Forestry, St. Paul 1, Minn.

University of Missouri, Department of Forestry, Columbia, Mo.

Montana State University, School of Forestry, Missoula, Mont.

State University of New York, College of Forestry, Syracuse 10, N. Y.

North Carolina State College, School of Forestry, Raleigh, N. C.

Oregon State College, School of Forestry, Corvallis, Oreg.

Pennsylvania State College, Department of Forestry, State College, Pa.

Purdue University, Department of Forestry, Lafayette, Ind.

Utah State Agricultural College, School of Forestry, Range and Wildlife Management, Logan, Utah.

University of Washington, College of Forestry, Seattle 5, Wash.

West Virginia University, Division of Forestry, Morgantown, W. Va.

Yale University, School of Forestry, New Haven 11, Conn.

Not Accredited

The following institutions offer professional and technical curricula in forestry, but do not meet the requirements for accreditation.

Arkansas Agricultural and Mechanical College, Department of Forestry, College Heights, Ark.

Stephen F. Austin State College, Department of Forestry, Nacogdoches, Tex.

University of Connecticut, Department of Forestry and Wildlife Management, Storrs, Conn.

Harvard University, Harvard Forest, Petersham, Mass.

Louisiana Polytechnic Institute, Department of Forestry, Ruston, La.

Michigan College of Mining and Technology, Department of Forestry, Houghton, Mich.

University of New Hampshire, Department of Forestry, Durham, N. H.

Oklahoma Agricultural and Mechanical College, Department of Forestry, Stillwater, Okla.

University of the South, Forestry Department, Sewanee, Tenn.

Virginia Polytechnic Institute, Department of Biology, Blacksburg, Va.

State College of Washington, Department of Forestry and Range Management, Pullman, Wash.

Introductory, Preforestry, and Specialized Courses

University of Arkansas, Department of Horticulture, Fayetteville, Ark.

Centenary College of Louisiana, Department of Biology, Shreveport, La.

Clemson Agricultural College, Department of Botany, Clemson, S. C.

Cornell University, Department of Conservation, Ithaca, N. Y.

Grand Rapids Junior College, Grand Rapids, Mich.

Idaho State College, Pocatello, Idaho.

University of Illinois, Department of Forestry, Urbana, Ill.

University of Kentucky, Department of Horticulture, Lexington, Ky.

Lassen Junior College, Division of Vocational Forestry and Lumbering, Susanville, Calif.

Mississippi State College, Department of Forestry, State College, Miss.

John Muir College, Pasadena 3, Calif.

North Dakota Agricultural College, Department of Horticulture and Forestry, Fargo, N. Dak.

North Dakota School of Forestry, Bottineau, N. Dak.

Northwestern State College, Agriculture Department, Natchitoches, La.

Ohio State University, Department of Horticulture and Forestry, Columbus 10, Ohio.

Paul Smith's College, Forestry Department, Paul Smiths, N. Y.

Rutgers University, Department of Forestry, New Brunswick, N. J.

Rutland Junior College, Rutland, Vt.

Superior State College, Botany Department, Superior, Wis.

University of Tennessee, Department of Horticulture and Forestry, Knoxville 16, Tenn.

Texas A & M College, Department of Range and Forestry, College Station, Tex.

University of Vermont, College of Agriculture, Burlington, Vt.

University of Virginia, School of Forestry, Charlottesville, Va.

University of Wisconsin, College of Agriculture, Madison, Wis.

Ranger Schools

State Forest Ranger School of the University of Florida, Lake City, Fla.

State Ranger School of State University College of Forestry, Wanakena, N. Y.

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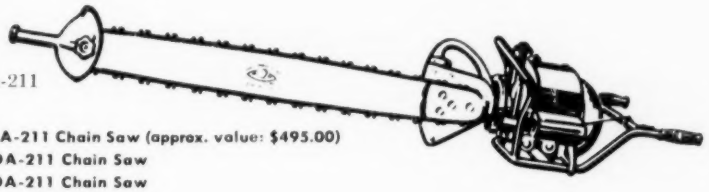

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1st prize $500.00 cash and a DA-211 Chain Saw (approx. value: $495.00)
2nd prize $300.00 cash and a DA-211 Chain Saw
3rd prize $200.00 cash and a DA-211 Chain Saw
4th prize $100.00 cash and a DA-211 Chain Saw
5th & 6th prizes—each a DA-211 Chain Saw

Contest 2

For naming the Disston DO-101 Chain Saw—
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3rd prize $200.00 cash and a DO-101 Chain Saw
4th prize $100.00 cash and a DO-101 Chain Saw
5th & 6th prizes—each a DO-101 Chain Saw

BUT REMEMBER—get your dealer or distributor to help you to enter either or both contests, *you must have official entry blanks.* You can get them FREE, along with contest rules and instructions, from your nearby Disston Chain Saw dealer or distributor. If you don't know his name, write us. Go to your dealer and get your contest entry off this week sure! Contest entries must be postmarked October 31, 1953, or earlier.

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